FIRST AERO WEEKLY IN THE WORLD

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FLIGHT

The AIRCRAFT ENGINEER AND AIRSHIPS

OFFICIAL ORGAN OF THE ROYAL AERO CLUB

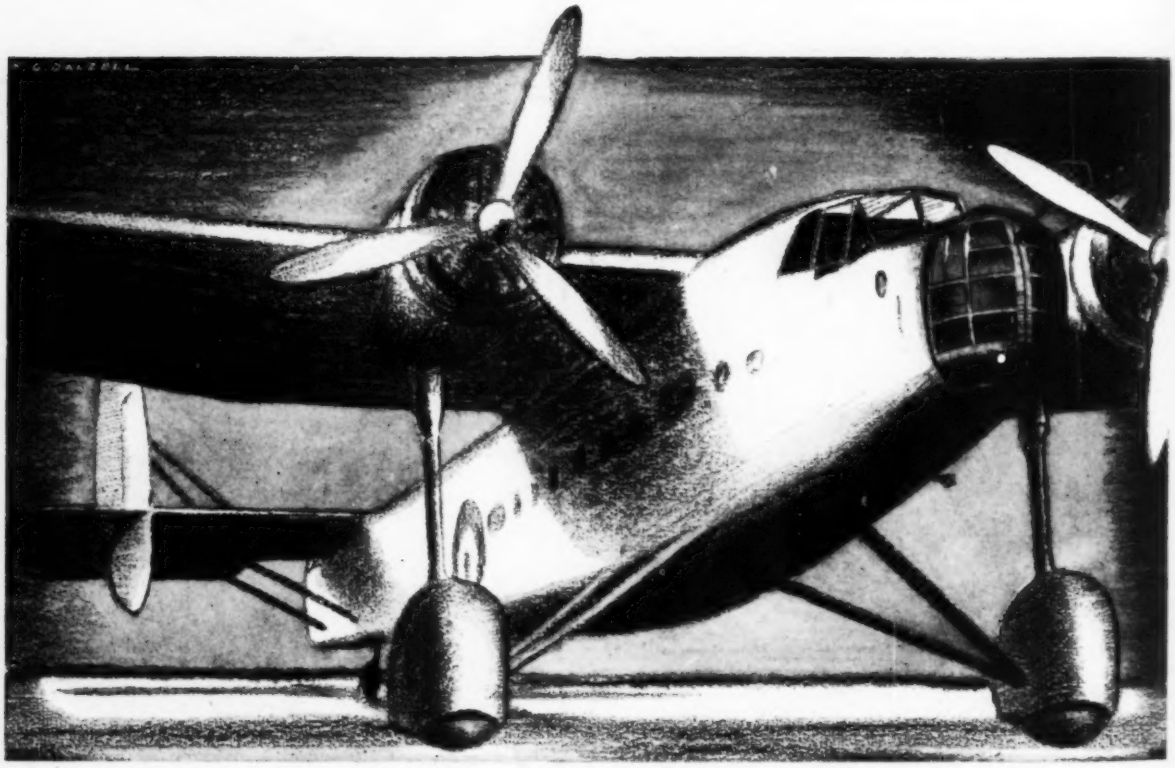
Blackburn "SKUA"

NOW IN QUANTITY PRODUCTION FOR THE R.A.F.

"Bristol"
Bombay

BOMBER, TRANSPORT or TROOP CARRIER.

An all-metal high-performance aircraft fitted with two "Bristol" Pegasus engines.



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FLIGHT

The AIRCRAFT ENGINEER AND AIRSHIPS

FIRST AERONAUTICAL WEEKLY IN THE WORLD : FOUNDED 1909

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The Outlook

Well—That's That

BY no stretch of the imagination could it be said that 1938 was a happy, nor even a comfortable, year. Rumblings which indicated that all was not well with the R.A.F. expansion and its concomitant aircraft production began quite early in the year, and before many months the then Air Minister, Lord Swinton, was sacrificed—somewhat harshly and unfairly, many thought—and Sir Kingsley Wood appointed in his place.

It may be admitted that there had been too much tendency to pretend that things were going better than, in fact, they were, and that demands for reorganisation inside the Air Ministry had been met time after time by flat refusals; but in all fairness to Lord Swinton it must be conceded that a scapegoat was wanted, and the choice fell upon him. Actually, much of the improvement now seen was initiated by Lord Swinton, and the present Secretary of State for Air is getting the credit.

The crisis in September, if it did nothing else, served to show up our shortcomings, and from then onwards our efforts have been redoubled. That is not to say that all is now well. Far from it. The statement by Sir Kingsley Wood in the House on December 21, in reply to a question by Mr. Oliver Simmonds, that during 1938 the monthly rate of aircraft production has more than doubled does not *necessarily* mean anything. Twice nothing is still nothing! While it is not suggested that production was nil in 1937, it *is* a fact that it was very small, and twice a small production is still a small production.

Quite recently new forces have begun to work within the Air Ministry. The establishment of directorates for production of aircraft, engines, equipment, and so forth, is but one phase of the new "drive." There are corresponding moves being made in the aircraft industry itself. Large concerns with enormous manufacturing resources are being brought into the aircraft industry. Their influence upon rate of production obviously cannot make itself felt for many months, but in time the benefits will be very substantial. The extension of the sub-contracting system, and its rationalisation, is another source from which increasing supplies are to be expected. But although the ploughing and sowing were done in 1938, the reaping of the harvest must be awaited in 1939.

The Expanding Air Force

WHILE there has been hectic activity in our aircraft and aero engine factories, the expansion of the R.A.F. has been proceeding at an increasing rate. The six Commands which administer home defence have increased in scope and importance. Bomber Command administers six groups and 29 stations; Fighter Command, four groups and 23 stations; Coastal Command, two groups and 17 stations; Training Command, five groups and 36 stations; Maintenance Command, 17 units and sub-units; and Balloon Command, one group.

According to the December Air Force List there are at the present time 135 squadrons in the R.A.F. at home and overseas. In their respective classes the numbers of squadrons are: Bomber, 73; fighter, 28; general reconnaissance, 17; army co-operation, 12; torpedo-bomber, 3; and communications, 2.

On a much smaller scale, but still showing considerable growth, is the Auxiliary Air Force. At present this numbers 11 fighter squadrons, 4 bomber squadrons, 3 general reconnaissance squadrons, 2 army co-operation squadrons and 10 balloon squadrons.

With such a vast increase in the amount of flying it is but natural that there should be an increase in the number of accidents. It is difficult to obtain accurate figures, but it appears probable that the number of accidents for a given number of flying hours is no greater than formerly; it may even be slightly smaller. That

is not to say that there is cause for complacency. Far from it. It is more than ever necessary to do everything possible to reduce all risks which are not inseparable from service flying. What is particularly and urgently wanted in the immediate future is better navigational training and a vast increase in the wireless facilities available so that we may reduce the distressing number of accidents which occur as a result of the weather deteriorating while service aircraft are out on flights. The matter is "receiving attention," but is the extreme urgency realised?

Technical Achievements

FROM the technical point of view, 1938 was not a bad year. Several new types of aircraft and engine were produced which are a credit to British technicians. The two outstanding achievements of the year as far as engines are concerned were the perfecting and issue for service of the Rolls-Royce Merlin liquid-cooled engine, and the great progress made by the Bristol company in sleeve-valve air-cooled engine development.

On the aircraft side the past year was one of putting existing types into production and issuing them to the R.A.F. rather than a year of prototypes. That new types *were* brought out during the year may be taken for granted, but secrecy regulations prevent any reference being made to these.

Civil experimentation during the year was directed mainly towards increased range while carrying a reasonable pay-load. The experimental flights of the Short-Mayo Composite were entirely successful as far as proving the practicability of this form of assisted take-off was concerned, and the flight from Dundee to Orange River, in South Africa, by *Mercury* established a new world's record for distance. Simultaneously, Imperial Airways continued research and development of refuelling in the air, and 1939 is likely to see this method of increasing range and pay load put to the test.

Another world's record beaten by British aircraft during the year was the flight by two Vickers Wellesleys from Egypt to Australia, non-stop. Actually, three machines made the attempt, and all beat the record, but one of the three landed at Koepang and continued to Darwin after refuelling. That an attempt to beat the world's speed record will be made in 1939 there is little doubt. In addition to the Supermarine Spitfire now being groomed for high-speed flying, a special record machine is being built by another firm and will be fitted with an engine which is still secret.

And, finally, for sheer aerodynamic efficiency there is nothing to beat the De Havilland Albatross produced during 1938 and now in service with Imperial Airways.

Civil Aviation

IN commercial aviation the great achievement of 1938 was the carrying through of the Empire air routes to South Africa and Australia and the sending of all first-class mail without surcharge. Towards Christmas the task of carrying the mails became a severe strain on the resources of Imperial Airways, but by taking into use every aircraft in its own possession and hiring machines from anyone who had a machine to spare, the company succeeded in carrying 400 tons of Christmas air mails to and from Empire centres. That this could not be accomplished without sacrifices in other directions is not to be wondered at. Passengers had to be refused, and great inconvenience was doubtless caused in many instances. It is difficult, however, to see how the company could have done anything else in the circumstances.

Internal commercial aviation has been in a somewhat fluid state during the year. A new licensing authority has been set up, and we are just now in the middle of hearing the claims of rival concerns for some of the internal air routes, and for their share of the £100,000 set aside, out of the total of £3,000,000 voted for commercial aviation, for encouraging commercial aviation at home.

The Civil Air Guard scheme was launched, somewhat hurriedly, during the summer, and although candidates have enrolled by the thousands, the flow of "A" licence pilots has barely had time to begin, as the schools had to get ready, obtain extra aeroplanes, and generally prepare for expansion.

Private flying has all but ceased, due mainly to the establishment of so many State-aided flying schools, at which tuition is paid for by the Government, but due also to the fact that few manufacturers have seen fit to cater for the private owner by producing new types for him. They have all been roped into the R.A.F. expansion in one way or another.

Safety First

THE lamentable series of accidents to modern high-speed commercial aircraft which have occurred recently in Europe and America lends point to a plea advanced by *Flight* many months ago. We expressed the hope that, in spite of obvious difficulties, it might be possible for airlines to come to some agreement about speed limitations. So long as all goes well it is fine to cruise at 250 m.p.h., but there is no denying the fact that the results of mishaps which would have been comparatively insignificant in the slower aeroplanes of a few years ago have proved liable to be very serious with machines built to the modern formula. Cannot we call a halt in the mad speed race until safety at the lower end of the speed range has been achieved?

A Base in New Guinea

THE energy with which Australia is setting about the strengthening of her defences is quite admirable. A defence budget of sixty-three millions to be spent by the end of the year 1940-41 means a big effort for a population of seven million souls. The determination to acquire a battleship for the Royal Australian Navy is, perhaps, the most striking feature of the programme, though it was interesting to learn from a recent speech of the Defence Minister, Brigadier Street, that the Commonwealth Government has received assurances that in an emergency Britain would station at Singapore a fleet strong enough to safeguard British interests. That indicates a healthy British naval margin, for the Atlantic and the Mediterranean will, of course, be sufficiently defended.

The vote for the Royal Australian Air Force is about sixteen and a half millions, and the Minister's speech foretold close co-operation between the three Australian fighting services. The Army is to establish fixed defences at Port Moresby on the northern coast of New Guinea, and this place will be a base for cruisers, while the R.A.A.F. is to station flying boats there. This pushing forward of a reconnaissance base is sound tactics, and should go far to prevent a surprise attack. In fact, a strong striking force of warships and aircraft based on Port Moresby might make it a parlous business for an enemy fleet to get round New Guinea to the coast of Australia.

DIARY OF FORTHCOMING EVENTS—PAGE 601

OUT of the HAT

Testing Handley Page Hampden Bombers

(Illustrated with "Flight" photographs.)

"THEY all come out of the hat like this one," explained Capt. J. H. Cordes, chief test pilot of Handley Page, Ltd., as he cut the engine switches of Hampden No. L—— after a routine test flight. Which may be considered as meaning that after little more than half an hour in the air Hampdens are hurried away from Radlett to squadrons of the Royal Air Force.

The Handley Page Company is now working up to peak production with this exceedingly popular and formidable twin-engined bomber, and the staff at Radlett, where the machines are assembled and tested after being delivered from the Cricklewood factory, is kept hard at it, though just how many times a week Capt. Cordes and his colleague, Flt. Lt. Talbot, refill their report-sheet holders is known (in theory at least) only to a select few. It can be said, however, that sufficient Hampdens have been delivered to the Service to arouse unusual enthusiasm.

Sir Thomas Inskip, Minister for Co-ordination of Defence, lately declared that we shall be requiring Hampdens up to 1940 and that apart from the Herefords (Hampdens with Napier Dagger engines instead of Bristol Pegasus) under construction in the Belfast works of Short and Harland, Ltd., an "educative" order for Hampdens has been placed in Canada. From this point of view the Hampden has an important advantage which, in the words of Sir Thomas Inskip, "is not to be sneezed at": it could be flown across the Atlantic immediately upon completion.

It was recently the writer's privilege to visit Radlett aerodrome to follow the progress of a Hampden from the time it is assembled under the eye of Mr. W. H. MacRostie (Works Superintendent) until it disappears to a destination which must remain unspecified.

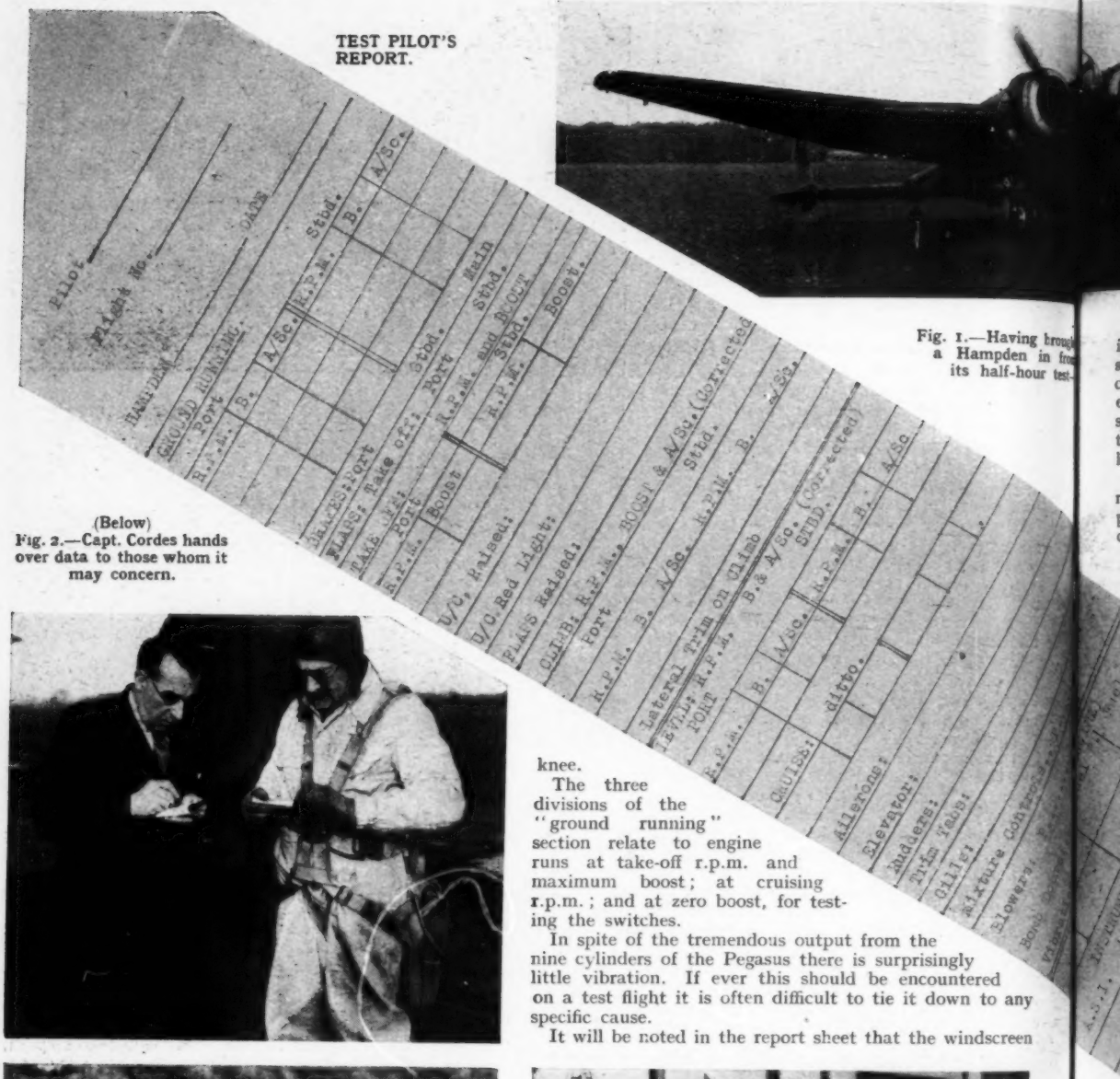
Capt. J. H. Cordes, the chief test pilot, climbs to a Hampden's cockpit.

To summarise the salient characteristics of the Hampden, it is an all-metal mid-wing bomber monoplane fully equipped with Handley Page slots and slotted flaps and fitted with two Bristol Pegasus engines, which have two-speed superchargers and deliver a maximum output of 885 h.p. each at 15,500 ft. This type of Pegasus gives 1,000 h.p. at lower altitudes. Compared with its forerunner, the Harrow, the Hampden carries a bigger load over a longer distance at a much higher speed, though its overall dimensions are very considerably smaller.

After undercarriage tests in the hangar each Hampden is taken out on to the tarmac and given an initial engine run under the supervision of a representative of the Bristol company before being handed over to the flying department for a specified series of tests. These start with a run over to a rough corner of the aerodrome where the brakes and undercarriage legs are tried out. The pilot is always accompanied at this stage by a mechanic who may make any minor adjustments on the spot. After about ten minutes the machine usually taxies back to the tarmac to drop the mechanic and almost immediately starts off on its flight tests. The standard sequence of tests is best understood with reference to the accompanying replica of a test pilot's report-sheet blank, which is carried in a device rather reminiscent of the film winding system of a common camera and strapped to the pilot's

One of Capt. Cordes' colleagues—Flt. Lt. J. R. Talbot, test pilot.

Fig. 1.—Having brought a Hampden in from its half-hour test-



(Below)
Fig. 2.—Capt. Cordes hands over data to those whom it may concern.

knee.

The three divisions of the "ground running" section relate to engine runs at take-off r.p.m. and maximum boost; at cruising r.p.m.; and at zero boost, for testing the switches.

In spite of the tremendous output from the nine cylinders of the Pegasus there is surprisingly little vibration. If ever this should be encountered on a test flight it is often difficult to tie it down to any specific cause.

It will be noted in the report sheet that the windscreen

Fig. 3.—Minor adjustments are occasionally necessary. On the right is Wing Cdr. R. R. Graham, liaison officer between Handley Page's and the Service.

Fig. 4.—"Passed O.K." The chief test pilot hands a pass-out chit to the A.I.D. inspector. On the wall is a *Fligh* photograph of a Heinkel under the influence of H.P. slots.

is tested for distortion and that the sliding canopy over the pilot's cockpit must be found to work easily. A moment's reflection will show the importance of these details, which at first glance seem far less vital than do some other items.

Only rarely is a second test flight required (despite the added complication of a retractable undercarriage, the Hampdens are being passed out even quicker than were the Harrows), and as soon as Capt. Cordes has given his O.K. to the A.I.D. a call is put through to the Service advising that another Hampden (or perhaps two or three) is ready to be collected.

Capt. Cordes explained that the Hampden has no dual control, but that every pilot who is new to the type is blindfolded with the machine stationary and taught to operate all his controls instinctively. A quick reference table of operational sequences facilitates his first few hours of flying. This instruction, of course, is given at a Service aerodrome.

Incidentally, it should be made clear that there is a vast difference between ".production" tests and the manufacturer's trials of a prototype, during which a machine spends many hours in the air and is subjected to climbing, diving and speed tests and is taken up to its service ceiling.

H. F. K.

(Above)
Fig. 6.—The Service prepares to take its new acquisition home. This view, incidentally, shows the H.P. slot admirably.

(Right)
Fig. 5.—The A.I.D. representative hands over the approval to the Service.

An exact representation of a report sheet, as carried in a roller case strapped to the pilot's knee—

A.I.D.
Eng. Pump
Fuel Cock
Oil Cock
SLOTS (A.S.I.)
Elevator
Rudder
Ailerons
Trimmers
Flaps
Hand Pump
Klaxon
Brakes; Main
Windscreen (Elec.)
Canopy (Hyd.)
Handgrips (Ert.)
Seat & Arms
Rudder Pedals
Harness & Release
Throttle
Airscrew Controls
Mixture
Gills
Compass
Instruments
Main Tanks
Gravity Tank
Contents
Pressure
Oil Temp.
Oil Press.
Cylinder Temp.
Boost
R.P.M.
Fuel Press.
Oil Dilution
Starter
Ignition
Priming
Hand Starter
Tail Wheel
Tail Skid
Tow Ring
Aerial
Navigation Lights
Identification Lights
Signalling Lamp
Recognition Signals
Pyrotechnics
Oxygen
Camera Gun
Bomb Gear
Bomb Sights
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Bomb Release
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Gun Firing
Gun Stoppages
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C.A.G. HEART-CRY

"What Do They Want Us to Do?"

ALTHOUGH the writer of this article apparently wishes to remain anonymous even to the extent of failing to enclose his name and address for our own information (will he please do so?), his views are so typical of those we have heard expressed by other C.A.G. aspirants that they deserve ventilation forthwith

I AM a C.A.G. As they go, I think I am pretty lucky. I did not get into the first batch to start immediate flying training, but I did get into the second batch, which is now doing ground training in readiness to follow on as soon as vacancies occur. Also, I entered a C.A.G. unit run by one of the older clubs, which from many points of view is an advantage. They are well equipped both as regards aeroplanes and staff, and have enough accommodation available to provide comfortable quarters for their C.A.G. members. Altogether, I have a lot about which to be appreciative. But that does not prevent me from being critical.

In the first place, I got the impression that the scheme was launched very hurriedly and without any very clear idea as to what it was intended to achieve. I am not sure how many hundred applicants there are in my particular unit, but I am very sure that it is going to take the club a good many years to train them all. I am very sure, too, from what I have seen of them that a considerable percentage are going to be no earthly use as pilots in time of national emergency, if that is what we are being trained for.

I should think that about 50 per cent. of us are young enough and fit enough to be of use from that point of view, and perhaps another 25 per cent. at the outside could do non-combatant jobs as pilots if they had enough training. The remaining 25 per cent. may be of use to civil aviation in various indirect ways, but I cannot see them doing a useful flying job in time of war. Perhaps the Powers that Be have something else in mind for them, but I think it would be fairer and better for the country as a whole if they could tell us definitely what they really have in mind. After all, this new national registration scheme is coming along in the near future, and those who have enrolled for the Civil Air Guard ought to know definitely whether they can be more useful by waiting their turn to learn to fly or whether they ought to volunteer for some other form of national service. One imagines that the clubs themselves want to know that, too; after all, they have to equip themselves to try to deal with colossal waiting lists. If those waiting lists have to be cut down to about half the present size because the people on them are going to be invited to volunteer for other jobs, then it seems to be rather important for the clubs to know about it.

Rumours

When the C.A.G. was first formed the general idea seemed to be to get everybody possible into the air regardless of sex or age, but since then we have had a crisis and all sorts of rumours are flying around to the effect that the C.A.G. is to be reorganised and put, for the time being at any rate, on a basis on which it can serve a more useful purpose in the country's scheme of air defence. On the other hand, rumours have also been rife to the effect that the R.A.F. would have no use whatever for C.A.G. pilots in time of war, and that, on the contrary, they would rather accept for training people who have had no previous flying experience. It is said that senior R.A.F. officers have expressed themselves publicly to that effect, which is not very encouraging to those of us who are spending our spare time and spare money in trying to make ourselves efficient.

There are other points which seem to me to call for criticism. In my unit, for example, both those who have commenced flying and those on the immediate waiting list are being given a course of ground training. I haven't the expert knowledge to know how good the lectures are, but at any rate they are very interesting, and I feel that they are going to be helpful to us when we actually get into the air. Talking to other C.A.G.s, however, I find that these lectures are apparently a matter for each individual club. Some clubs give them, and some don't; moreover, where they are given they are given as the result of individual voluntary efforts by the club and its members, and do not really form any part of the scheme. It seems to me that they should definitely form part of the scheme, and should, as far as possible, be standardised.

Again, there seem to be very different ideas among the various clubs as to the lines on which the C.A.G. units ought to be run. In my own case the position is that officially we are more or less segregated from the ordinary members of the club. We have our own accommodation in the club-house and the ordinary members have theirs. When we meet on the tarmac the attitude of the club members varies quite a lot. Some of them go out of their way to be decent and to make us feel that we are part of the show, even to the extent of taking up for joy-rides and air experience those who are still on the waiting list. Others rather look down their noses at us and make us feel that we are only there on sufferance. For example, they complain loudly in our presence that they cannot get machines to fly because of the C.A.G.s, and so on.

Comparisons

I do appreciate their point of view; I know that their money and work must have kept the club going all these years, and that it must be rather trying now to find that they cannot get a machine when they want one. At the same time, it's not very pleasant for us, who certainly don't want to do them out of any flying, but only want to make ourselves useful to the best of our ability, and it inevitably leads to our drawing comparisons between those who are out to be helpful and decent and those who are not.

We haven't yet had any individual appointed to take charge of us on the ground and to keep us running along the right lines. Nor have we yet been issued uniforms, and even when we do get them I understand that we are not to have any kind of head-dress, which will make us look rather silly when we have to send a contingent to represent the C.A.G.s at official occasions, as I hope we may have to do. We haven't had any sort of disciplinary training, and although I know we did not join up as soldiers, it does seem to me that if we are to be of real value we ought at least to understand the meaning of an order and obeying it. Here, again, it seems that C.A.G. units are run on widely varying lines, some attaching importance to discipline and others not worrying about it.

Another point is that in our unit we are short of flying instructors. They have three "B" licence instructors and at least as many more experienced "A" licence pilots who would be willing to give up their time to give voluntary flying instruction. I understand that they cannot do so because of a dispute between the Air Ministry and some commercial pilots' organisation, which has been going on for months. [Actually, there is no legal obstacle to such instruction starting right away, but many of the clubs have been awaiting approval of the organisation in question.—ED.] Isn't it about time that something definite was decided so that the clubs could get on with the job?

(*Concluded on page* 600.)

SERVICE AVIATION

Royal Air Force and Official Announcements : *Flee Air Arm News : Military Aviation Abroad*

HAMPDENS about to leave their makers' aerodrome for delivery to squadrons. An article on the flight-testing of these machines appears on pages 591-593.

Awards for Gallantry

THE Air Ministry announces that the King has been graciously pleased to approve of the undermentioned rewards for gallant and distinguished services rendered in Palestine:—

Distinguished Flying Cross.—F/O. (Acting Flt. Lt.) Frederick Campbell Hopcroft.

Distinguished Flying Medal.—Sgt. John Onions.

Halton Passing-out Inspection

AIR MARSHAL SIR FREDERICK BOWHILL, K.C.B., C.M.G., D.S.O., inspected No. 1 School of Technical Training (Apprentices) at Halton on December 20. The following are extracts from the report of the A.O.C., Air Comdre. G. B. Dacre, D.S.O.:—

"The apprentices now passing out from Halton are the 33rd Entry to complete their training. Of the 853 originally attested at Halton, 148 were posted to Cranwell and 35 were transferred to other entries. I regret to say that two have died while 53 have either been transferred or were discharged for various reasons, leaving a total of 685 to complete their training at Halton.

"As a result of the final examination 4 apprentices, representing 0.6 per cent., have been classified leading aircraftmen; 388 apprentices, representing 56.4 per cent., have been classified aircraftmen 1st class; 272 apprentices, representing 40 per cent., have been classified aircraftmen 2nd class; and 20 apprentices failed to qualify.

"Although the number passing out as leading aircraftmen is disappointing, I think the results as a whole can be considered as satisfactory during a time of great expansion.

"The fitter armourers, numbering 51, have completed their syllabus without difficulty. Apprentices of this trade who are now remaining at Halton will transfer to Cosford in January next year and the next entry will pass out from there.

"In health the entry has been well up to the average standard. The general standard of discipline and drill has been satisfactory.

"It may be of interest to record that, although there was considerable disturbance of personnel at Halton during the recent crisis, the training was carried on normally and not a single hour of the syllabus was lost."

Prize-winners were as follows:—

Grand Aggregate.—1st Prize: Sgt./App. Hayne, C.J. 2nd Prize: Sgt./App. Daniel, H. 3rd Prize: Sgt./App. Clifford, R. H.

Educational Subjects.—1st Prize: Sgt./App. Clifford, R. H. 2nd Prize: A/A. White, E. R.

Fitter II.—1st Prize: Sgt./App. Hayne, C. J. 2nd Prize: Sgt./App. Robinson, C. R. 3rd Prize: Sgt./App. Daniel, H.

Fitter Armourer.—A/A. Bishop, L. H.

Elliott Memorial Prize.—Leading A/A. Sherwood, R. N.

Crebbin Robinson Cup.—Leading A/A. Allchurch, I. F. R.

Cadetships.—Sgt./App. Clifford, R. H.; Sgt./App. Deas, J. H.

Viscount Wakefield Scholarship.—Sgt./App. Clifford, R. H.

Station for Dumfries?

SIR KINGSLEY WOOD stated last week that it had been decided, subject to satisfactory guarantees that the necessary housing would be provided, to acquire land in the neighbourhood of Dumfries for development as an aerodrome and to establish an R.A.F. station.

He made the announcement to a deputation he had received with Mr. John Coalville, Secretary for Scotland, from the county and burgh of Dumfries, which asked that consideration be given to the facilities available at Dumfries in connection with the R.A.F. expansion programme.

Sir Kingsley afterwards explained why it had not been possible to proceed with the scheme for the establishment of an R.A.F. repair depot at Dumfries.

Fairey P.4/34s for Denmark

A COMMISSION of experts was appointed some time ago to study suitable foreign aircraft designs with a view to their production in Denmark. This commission narrowed down possibilities to the Junkers Ju. 87b, the Hawker Hurricane, and the Fairey P.4/34, specially developed as a dive bomber.

The last-named machine has been adopted, and two representatives of the Danish Admiralty, Capt. E. Rasmussen and Mr. M. P. Eskildsen, have signed a contract with the Fairey Aviation Company regarding licence rights. The new dive bombers will be constructed for the Danish Fleet Air Arm in the Naval Dockyard at Copenhagen, the first order being for about 24 machines.

Royal Air Force Gazette

Royal Air Force

General Duties Branch

The following Flying Officers are granted the acting rank of Flight Lieutenant on the dates stated:—P. T. Philpott (September 24); E. J. C. Michelmore (October 15); J. R. Maling (October 16); F. R. Foster (November 4); J. P. Marriott (November 14); J. Vivian (November 28); C. Fothergill (December 5); A. C. Heath (December 6).

The following Flying Officers relinquish the acting rank of Flight Lieutenant on the dates stated:—R. P. Widdowson (September 23); F. L. Newall (November 4); R. I. K. Edwards (November 17); J. Edwardes (November 18).

F/O. A. D. Bryant (Captain, The Royal Northumberland Fusiliers) is granted the honorary rank of Flight Lieutenant (August 1); Capt. N. R. M. Skene, R.M., is reattached to the Royal Air Force as a Squadron Leader with effect from December 5, and with seniority of July 1; Capt. R. T. Partridge, R.M., Flight Lieutenant, R.A.F., ceases to be attached to the Royal Air Force on return to duty with the Royal Marines (November 17); Flt. Lt. H. C. S. Vetch is transferred to the Reserve, Class A (December 12).

Chaplains Branch

The Rev. J. Black, O.B.E., M.A., relinquishes his honorary commission on account of ill-health and is permitted to retain the honorary relative rank of Group Captain (November 30).

Royal Air Force Reserve

RESERVE OF AIR FORCE OFFICERS

General Duties Branch

F/O. J. Grierson is promoted to the rank of Flight Lieutenant (October 28).

Auxiliary Air Force

General Duties Branch

No. 904 (COUNTY OF SURREY) (BALLOON) SQUADRON.—F/O. Marshall promoted to the rank of Flight Lieutenant, November 18, 1938.

No. 905 (COUNTY OF SURREY) (BALLOON) SQUADRON.—Flying Officers promoted to the rank of Flight Lieutenants, November 9, 1938: K. A. H. Hassell, M.C., W. G. T. Summers, M.C., D.C.M., M.M.

No. 907 (COUNTY OF MIDDLESEX) (BALLOON) SQUADRON.—Rt. Hon. The Earl of Athlone, K.G., G.C.B., G.C.M.G., G.C.V.O., D.S.O., appointed Hon. Air Commodore, December 20, 1938.

No. 909 (COUNTY OF ESSEX) (BALLOON) SQUADRON.—C. E. Benson, D.S.O., granted commission as Flight Lieutenant, September 5, 1938.

Owing to the greatly increased length of these lists, as a result of R.A.F. expansion, ranks are confined to those of Flight Lieutenant and above.

THE YEAR tha

January

THE Short Mayo Composite made her first taxying tests in the Medway.

A. V. Roe and Co., Ltd., celebrated their twenty-fifth anniversary as aircraft constructors.

Mr. F. Handley Page was appointed first president of the Society of British Aircraft Constructors, and Sir Charles Bruce-Gardner was appointed full-time chairman.

Announcement was made of the intention to attack the world's long-distance record with a formation of Vickers Wellesleys.

Pan-American Airways lost their Sikorsky *Samoan Clipper* on her first official flight from San Francisco to New Zealand, apparently owing to a fire while dumping fuel. The crew of seven lost their lives.

The Aerodrome Owners Association held their annual conference, but there was no airports exhibition.

Allegations were made in Press and Parliament that the aircraft production programme was badly behind.

It was announced that there would be no more Royal Air Force Displays at Hendon.

The Admiralty appointed two directors to deal with the Fleet Air Arm, which was gradually coming under its control.

Three Savoia Marchetti S.79 bombers of the Italian Royal Air Force made a formation flight of 6,250 miles over the South Atlantic in 24 hours.

The formation of a benevolent fund for the aircraft industry was announced.

His Majesty the King flew to Cranwell from Bircham Newton to inspect the Cadet College and the Electrical and Wireless Schools.

Eighteen Consolidated PBY flying boats of the U.S. Navy, manned by 127 men, flew 2,578 miles from San Diego to Honolulu in 20 hr. 12 min. non-stop.

February

The Air Registration Board celebrated the first year of its work as the authority governing smaller civil types of aircraft.

The Short Mayo Composite successfully made its first separation, Mr. J. Lancaster Parker and Mr. H. L. Piper being the pilots.

A commission of French technical experts visited this country to study production methods.

Flying Officer A. E. Clouston and Mr. Victor Ricketts failed in an attempt to fly to New Zealand and back in twelve days. Their D.H. Comet damaged its undercarriage in Syria.

Sqn. Ldr. J. W. Gillan flew a Hawker Hurricane from Edinburgh to Northolt in 48 minutes—a speed of 409 m.p.h.

Flight gave a detailed description of the Short Mayo Composite aircraft.

Short-service commissions were introduced in the Fleet Air Arm.

Fraulein Hanna Reitsch made an indoor flight in the Focke-Wulf helicopter in the Deutschlandhalle, Berlin.

The Short Empire Boat *Centurion* left for India and Malaya with the first batch of unsurcharged first-class mail.

March

The first stage in the trans-Canada air service was flown on March 1, when a machine left Winnipeg for Vancouver.

The Cadman Committee's report appeared, advocating sweeping changes in the administration of national and internal airlines and creating new posts on the civil side of the Air Ministry.

"Astronomical" Air Estimates were published — of a gross value of £111,502,000, reduced by appropriations to £73,500,000.

The Naval Estimates provided one and a half million pounds for Fleet Air Arm training.

An Armstrong Whitworth Whitley was illustrated, fitted experimentally with two Rolls-Royce Merlin engines.

The King made a tour of the Midland shadow factories.

The new Belfast Harbour airport was opened by Mrs. Neville Chamberlain.

Clouston and Ricketts' second attempt on the New Zealand record was successful, the Comet making the out and home journey in 11 days.

A German Do.18 flying boat, with Diesel engines, flew non-stop from Devon to Brazil—5,220 miles in 43 hours.

W. E. ("Bill") Davis, Cinque Ports Club managing director, was killed in an accident.

A French parachutist made a delayed drop from 27,560ft. and did not pull his rip-cord until within almost 1,000ft. of the ground.

The Royal Air Force took part in a two-day combined exercise with the Home Fleet.

April

The Boeing Stratoliner, designed to operate at 20,000ft., was described.

Centaurus left on the first accelerated service to Singapore and Australia.

Flight described the Dornier Do.17 bomber-fighter after a visit to the makers' works.

The Bristol Perseus XII sleeve-valve engine passed its 100-hours type test.

Earl Winterton stated in Parliament that the possibilities of American- and Canadian-built aircraft for the R.A.F. were being considered.

Mr. F. G. Miles revealed the designs for his 300-m.p.h. four-engined X-2 transport.

In the Commercial Aircraft Number of *Flight*, famous designers described their ideal of commercial aircraft of the future.

May

Members of both Houses of Parliament debated aircraft production progress.

The Armstrong Whitworth *Ensign* went to Martlesham.

His Majesty the King visited a number of Royal Air Force stations.

The R.Ae.S. Garden Party opened the "official" flying season.

Details of the Hawker Hurricane were made public and a detailed description appeared in *Flight*.

Another new "tricycle" aeroplane made its first public appearance—the Arpin.

Sir Kingsley Wood was appointed Secretary of State for Air and Capt. H. H. Balfour Under-Secretary.

Aeronautical History Made

The Finnish Aero Show was held and Helsingfors airport opened; both events were described in detail in *Flight*.

Three balloon barrage squadrons of the A.A.F. began to form.

Empire Air Day was celebrated in appalling weather at 88 aerodromes.

Mr. Glenn Martin, famous U.S. aircraft constructor, visited this country.

The new Air Minister set up a panel of industrial advisers to the Air Ministry.

Bristol Blenheim production methods were described.

June

Yugoslavia held its first aero show, at Belgrade.

S. T. Lowe (Gipsy Comper) won the London-Isle of Man Race; the Manx Air Derby, postponed owing to rain, was won by E. Gerbrecht (F.W.44) and the Tynwald race by P. B. Elwell (Cub).

Flight described the Westland Lysander in detail.

The Weir Mission to the United States recommended the purchase of training and G.R. types, but not fighters or bombers.

Sir John Reith was appointed full-time chairman of Imperial Airways.

The purchase of Lockheed 14s and North American trainers for the R.A.F. was officially announced.

The Gipsy Twelve engine was described in detail.

has PASSED

"Flight" photograph.

...me and Abroad During 1938

Manchester's new airport at Ringway was opened, as was the new Wolverhampton airport.

July

Alex Henshaw (Gipsy Six Mew Gull) won the King's Cup race at 236.25 m.p.h.

The centenary of Count von Zeppelin's birth was celebrated in Germany.

Sydney was reached by the first through flying boat service from Great Britain, in slightly over ten days.

Four Wellesleys of the long-range development flight flew from Cranwell to the Persian Gulf and back to Egypt.

The R.A.F. co-operated with the Royal Navy and the Army in combined coastal exercises.

Suffolk Air Day marked the opening of the new terminal building at Ipswich airport.

The National Gliding Contests at Dunstable began with a duration record by Flt. Lt. Murray and S. Sproule, who stayed aloft in a two-seater sailplane for 22 hr. 13½ min.

Horward Hughes and three companions completed a 14,874-mile trip round the northern Hemisphere in a Lockheed 14 in four days.

Luton airport was opened by Sir Kingsley Wood.

The D.H.-Hamilton Hydromatic airscrew was described.

The R.A.F. played an important part in Coast Defence Exercises.

Mercury, upper component of the Short-Mayo composite, made the fastest east-west Atlantic crossing (13 hr. 29 min.).

The Civil Air Guard scheme was officially announced.

Douglas Corrigan flew the Atlantic "by mistake" in an eight-year-old, single-engine Curtiss monoplane.

August

The D.H. Moth Minor was announced.

Sir Kingsley Wood opened another airport—Exeter.

H. Buckingham (Hornet Moth) won the Folkestone Trophy Race.

The first "shadow" built Fairey Battle emerged from the Austin factory.

Held on the grand scale, the R.A.F. Air Exercises were hampered by bad weather.

Private flying in France was "liberated" by a government decree.

Capt. Frank Barnwell, pioneer designer, lost his life in an accident.

Portsmouth and Southampton were both in the news with their rival claims for the Empire Air Base.

The Focke-Wulf Condor *Brandenburg* flew non-stop from Berlin to New York in 24 hr. 56 min. and returned in 19 hr. 54 min.

More shadow factories were announced—notably the Short and Harland enterprise at Belfast and the new Avro-million-pound factory.

Flight's chief photographer secured pictures, in Sweden, of the Gloster Gladiators used by the Swedish Air Force.

September

Placing of bomber contracts in Canada was announced.

A member of the staff of *Flight* described, in a series of special articles, a flying visit to Australia.

British Airways took delivery of their first Lockheed 14.

Flight published detailed drawings of the interior of the A. W. Ensigns.

Sqn. Ldr. M. J. Adam, holder of the altitude record, and John Hindmarsh, Hawker test pilot, met their deaths in accidents.

The Air Minister inspected barrage balloons at the Kidbrooke H.Q.

F/O. G. de Havilland, in the T.K.2, won a poorly supported London-Cardiff race.

The Air Transport Licensing Authority began its operations.

International relations became strained, and the Prime Minister made the first of his two historic flights to Munich by British Airways.

Flight published first photographs of the prototype H.P. Hereford (two Napier Dagger VIII).

F/O. David Llewellyn lost his life in an accident.

The 50 h.p. Cirrus Midget engine was announced.

The international crisis came to a head, and Mr. Chamberlain made his second flight to Munich. The world breathed more freely.

October

After separating from *Maia* at a 27,500lb. loaded weight, Mercury broke the world's long-distance seaplane record, by flying over 6,000 miles in 42 hours, from Dundee to the Orange River.

The Air Minister opened the new Cambridge Aerodrome.

Civil Air Guard lists were temporarily closed at 30,000 applications

British Airways made survey flights over the Lisbon route.

Important changes in Air Ministry personnel and internal organisation were made. Lt. Col. Outram was appointed Director of Production (Aircraft).

The Air Minister opened the new Fairey research department and wind tunnel.

Principally in order to launch a big aircraft sub-contract scheme, an important reorganisation of the Vickers group took place.

November

Regulations for the fitting of de-icing equipment to British transport machines came into force.

Flight, in its second British Aircraft Industry Number, reviewed the activities of 500-odd makers of equipment and materials.

Three Vickers Wellesleys of the R.A.F. long-range development unit flew 7,158 miles non-stop from Ismalia, Egypt, to Darwin, Australia, in 48 hours, beating the world's long-distance record by 856 miles.

Flight described in detail the new *Graf Zeppelin* and the new Gipsy Minor engine.

An operating merger between Imperial Airways and British Airways was announced.

Mr. T. P. Wright, Curtiss-Wright engineering director, lectured on American production methods before the R.Ae.S.

Flight described the D.H. Albatross in detail. The De Havilland D.H.95 all-metal transport emerged from the factory.

The Paris Aero Show opened, with an even greater predominance of military aircraft than usual.

The Bristol Taurus two-row sleeve-valve engine was announced, as was the Rolls-Royce Peregrine.

December

Flight described the Supermarine Spitfire and structural details of the Vickers Wellesley.

Mercury flew non-stop from Southampton to Egypt with a ton of mails.

Cabot, first of the "C" class Short boats, took off from the Medway for a full-load test carrying 1,000 lb. more than did *Caledonia* on any of her Atlantic crossings.

The Air Ministry moved into its new West End home, Berkeley Square House.

A Government white paper announced the decision of the Air Ministry to implement the Cadman recommendations for subsidising internal airlines; £100,000 was the sum specified.

The Cunliffe-Owen "Flying Wing" emerged from its factory.

Aviator's Certificates were issued at a record rate by the R.Ae.C. (see this issue—page 600).

PRIVATE FLYING

"Flight" photograph.

REVIVAL : M. Mignet's H.M.210 two-seater "Pou," with full-span elevator on the rear wing, in spectacular (but apparently safe) attitude.

"Pou" Redivivus

SINCE my rambling effusion last week one or two people have asked me what I meant when I said that there were still some enthusiasts flying and modifying *Poux*.

One of them is, of course, the irrepressible Monsieur Mignet, who is still smilingly certain—and he is probably right—that his little modified two-seater cabin *Pou*, complete with full-span elevator on the rear wing, has very considerable advantages over the conventional type of aeroplane. Evidently someone else thinks that he is right, too, because I hear on not too bad authority that the French Government have ordered a comparatively large number of them for Army co-operation or similar work. If I made that statement over here, in advance of official notification, I should be shot at dawn—even though the order has no particular tactical significance. But this is a free country. Possibly I shall be jailed in Paris.

In this country, too, there are a few amateurs who have still not quite lost hope that the machines they have built will one day leave the ground. One amateur from Scotland, though still believing that, aerodynamically, front wing control is sound in principle provided there is sufficient power to recover from a nose-down attitude, has built a *Pou* with both wings controlled, that at the rear operated in the reverse direction. As lift is increased at the front wing through the greater incidence, it is, at the same time and by the same movement of the control column, decreased at the rear wing by lessening the latter's incidence. In his view, the fixed rear wing version savoured rather too much of the "feathered arrow," and in its original form his machine did, in fact, dive into the ground from a comparatively low height—luckily without serious personal damage.

In his new type not only are both the wings controlled, but the sections are rather different (something like a modified Clark Y), with an increased turn-up at the trailing edge and with ply-covered leading edges. This machine has done some satisfactory flying, and it seems to be pretty good. In a case of emergency it was once pushed down into a steep dive in order to obtain speed, and it pulled out quite satisfactorily, finally making the last part of the descent in more or less Autogiro fashion. Unfortunately, the undercarriage was not designed for such treatment, and the place of landing was, in any case, a field of standing corn, so it turned on its back—without damage, personal or otherwise.

Power Shortage

THE whole trouble with this machine is that the engine has been both heavy and unreliable. And that is a good deal more than half the trouble with nearly every ultra-lightweight so far produced. With the exception of the Ford, which is heavy but at least reliable, there has hardly been a single engine under 40 h.p. which has been any good at all. Most of the ultra-lightweights have, therefore, been under-powered for their somewhat excessive weight; their performance has, consequently, been miserable to the point of frightening prospective owners.

In this case the engine used had too little clearance between the ends of the rings to allow for expansion, and it seized up regularly after about a minute of full throttle. This in 1938, after the internal combustion engine has been used, in one form or another, for more than forty years.

I am quite convinced that the ultra-lightweight type of machine would have had a more reasonable reception if some engine manufacturer who knew his job had produced a suitable power unit. I know I have said that before, but I still find no excuse for people who pretend to have designed an aero engine, when all they have done is to modify, not at all successfully, a basically unsuitable motor cycle engine.

Cautious Progress

SO that nobody will come along and ask me to fly a *Pou* just now, I must confess that I have always had the utmost distrust of the type, and ran like anything when anybody wheeled one out of a hangar. But that was only after I had learnt something about its irrecoverable diving characteristics. If some reputable constructor built a super *Pou*, fitted it with a reliable engine, and tested it with reasonable thoroughness, there would be no justification for any doubt other than that inseparable from the business of flying any new and strange type.

The fact that the rudder is controlled by the stick might be a bit worrying for a start, but I did once manage to fly, with fair success and safety, a machine (the Hordern-Richmond), in which, rationally but surprisingly, there was no rudder control in the accepted sense of the word. It is only that we have become accustomed to pushing our way round corners with a pair of clumsy feet.

Returning to the special *Pou*, this appears to be perfectly controllable at the stall, though the nose tends to swing from side to side and the whole machine sways gently. The movements can be corrected by rudder movement. Another point is that a rather higher undercarriage has been fitted, and this seems to improve the take-off very considerably and certainly reduces the landing speed because a fully stalled attitude can be reached before touching down.

The constructor explains that the business of flying with two movable wings is very little different, but he has had difficulty in arranging the correct rigging. If the front wing is too far forward the machine flies nose-high, and if it is too far back the take-off run is rather long. For those who are still interested in *Pou* construction it might be said that his front wing has an incidence range of 13 deg. and his rear wing a range of 8 deg. These ranges, at the moment, are quite experimental.

Remembering the previous *débâcle*, it would be a mistake for anyone to become too enthusiastic about the possibility of making a really useful *Pou* type, but I feel that the principle should not be forgotten. At least one owner, to my knowledge, has flown this type of machine quite satisfactorily, even though he was not permitted to go solo by an instructor in a conventional light aeroplane. That fact alone suggests that there is more than something in the principle, and that, in due time and with due caution, it may be rehabilitated.

INDICATOR.

LIGHTWEIGHT'S NON-STOP 2,800 MILES

Remarkable Performance by Continental-engined Aeronca Chief

The Aeronca Chief in the air at the start of its trans-continental non-stop flight.

EXCEEDING previous non-stop, non-refuelling lightweight distance records by 1,771 miles, an Aeronca Chief at the end of last month flew from Los Angeles to New York in 30 hr. 47 min. After covering the distance — which totalled 2,785 miles—the Chief is reported to have had sufficient fuel in its tanks for five more hours' flying at cruising speed; which suggests that the machine has a possible range, in the absence of adverse winds, of considerably over 3,000 miles.

The Chief, flown by Johnny Jones, took off from Los Angeles municipal airport at 6.31 a.m. (Pacific standard time), and, after flying all day and all night, was put down at Roosevelt field at 4.17 p.m. on the next day, giving an average speed of 91 m.p.h.

Needless to say, the machine had extra tankage in the form of three special tanks, which had a maximum capacity of 146 American gallons. The consumption of the 50 h.p. Continental engine was, therefore, approximately four gallons an hour, while only two quarts of oil were used during the entire trip. At the take-off, the Aeronca, which has a normal gross weight of 1,130 lb., weighed 1,925 lb.—nearly three times its own empty weight of 665 lb.

In a light machine carrying no very special navigating equipment the weather question on such a flight would be important. At the time of the start, American Airlines' weather bureau had said that the conditions, though not entirely favourable, would hold reasonably good for more than thirty hours. The take-off run from Los Angeles municipal airport was approximately 1,000ft. in length, and it took Jones only 40 min. to climb, at a set air speed of 70 m.p.h., to 3,300ft., after which the Chief was climbed rather less rapidly up to 7,500ft. for the crossing of the Rockies. The fact that the machine, at the very start of the flight, reached such an altitude with overload is itself remarkable.

Apart from the necessary navigation lights, battery and wind-driven generator, the Aeronca carried on this trip special cabin-heating equipment, an outside-temperature thermometer, rate-of-turn indicator, a sensitive altimeter and a carburettor heater control.

Next Year's Coupe Deutsch

THE 1939 race for the Coupe Deutsch will be held on October 1 from the aerodrome at d'Etampes. The course will be 100 km. (161 miles) circuit with a total distance of 2,000 km. (1,240 miles).

Seaplane Instruction

THE Royal Singapore Flying Club, which stands almost unique as one of the only two active "Royal" flying clubs in the Empire, is now installed in its new premises at the Singapore Airport. For years the only one in the Empire to operate seaplanes, the club now has a Miles trainer and a Whitney Straight for aerodrome use. The membership is well over two hundred.

The R.S.F.C. came into being in 1927, and was given an official send-off in 1928, when two D.H. Cirrus II Moths were christened. In due course the club was granted a subsidy for every "A" licence by the Government.

Incidentally, the other active flying club with the "Royal" prefix is the Aero Club of New South Wales, operating from Mascot Aerodrome, Sydney.

Dr. Piercy on Technical Training

"WE may as well try to train our flying officers on the footplates of locomotives as assume that aircraft development can be left to graduates trained in steam engine and boiler installations," said Dr. N. A. V. Piercy, head of the Department of Aeronautics, Queen Mary College (University of London), speaking at the College Charter Week celebrations.

Describing the part the Universities could play in aircraft development, Dr. Piercy spoke of recent important researches in the Queen Mary College Aeronautical Department into stalling problems.

He said that at the College there were three engineering departments—Civil and Mechanical, Electrical, and Aeronautical. That upstart, the Aeronautical, now claimed more than one-third of the total number of engineering students, and discharged a national service by contributing to the country's demand for trained men.

Subsidy in America?

THE new Civil Aeronautics Authority appears to be strongly in favour of some form of financial assistance for amateur pilots and private owners in the United States. In this connection, the Bennett plan involves the payment of $50 for a first solo, $50 at the end of the first ten hours and a flat payment of $100 a year to all non-commercial pilots. Apparently these payments will be made, if at all, directly to the amateur who earns them, and not to the clubs or schools. The latter will, presumably, arrange some "payment by results" system in which the recipient hands over his subsidy.

The Next R.Ae.S. Lecture

NEXT Thursday, January 5, Miss F. B. Bradfield, M.A., A.F.R.Ae.S., and Mr. D. L. Ellis, B.Sc., A.R.T.C., A.F.R.Ae.S., will read a joint paper on "The Use of Model Data in Aeroplane Design."

The paper will deal with some of the types of test which can be made in a designer's tunnel, and in particular the drag of an aeroplane under top-speed conditions, longitudinal stability, cooling problems, balancing of control surfaces, and measurement of maximum lift.

The authors show how, by proper use of model data, the designer can estimate the price he must pay to satisfy design requirements at the expense of drag and other considerations.

The lecture will be illustrated and given at 6.30 p.m. in the lecture hall of the Institution of Mechanical Engineers, Storey's Gate, Westminster, London, S.W.1. Visitors will be admitted to the lecture by ticket obtainable through a member of the R.Ae.S.

Resignations

MR. W. A. SUMMERS writes to say that after four years with Percival Aircraft, Ltd., he has resigned from his position as works manager to the company.

Mr. J. Buist Mackenzie states that he has resigned his position as secretary to the same company after two years' service in that capacity.

THE ROYAL AERO CLUB

News and Official Notices for *Week Ended December 24*

A Certificate an Hour

EVERY hour of daylight a new Royal Aero Club Aviator's Certificate is being granted. This remarkable boom in flying training is revealed by figures compiled this week and covering the four weeks just ended.

In all, 196 Certificates have been issued during this period. This is one of the highest figures ever reached, and, in view of the bad weather and limited hours of daylight, it is perhaps the most remarkable yet achieved. It compares with the thirty-nine Certificates gained during a comparable period last year.

Among the Certificates was one for an Autogiro. It is generally considered that the Civil Air Guard scheme is mainly responsible for the increase, and it is expected that there will be further even more spectacular increases in the spring and summer.

Record of Records

COMPARATIVE figures showing present and past air records and recalling the more noteworthy unsuccessful attempts made during the year are contained in a French publication entitled *L'Année Aeronautique, 1937-38*, which has been sent to the Royal Aero Club.

This work, which is approved by the Aero Club de France, is published by Editions Dunod, 92, Rue Bonaparte, Paris (VIe). It contains illustrations and performance figures for several of the leading aircraft of the world, and there are charts showing the progress of speed, height, and distance development with seaplanes and landplanes.

General Meeting

MARCH 29 was fixed, at a committee meeting held on December 21, as the date for the annual general meeting of the Royal Aero Club for 1939.

Records Claim Placed

OFFICIAL application has now been made by the Royal Aero Club to the Fédération Aéronautique Internationale for the homologation of the world's distance-in-a-straight-line record obtained by Royal Air Force aeroplanes on November 5-7.

First Crew.—Flt. Lt. H. A. V. Hogan; Flt. Lt. R. G. Musson; Flt. Sgt. T. D. Dixon.

Ismailia, Egypt to Koepang, Timor. Distance: 10,715.448 km. (6,658.3 statute miles).

Second Crew.—Sqn. Ldr. R. Kellett; Flt. Lt. R. T. Gething; P/O. M. L. Gaine.

Third Crew.—Flt. Lt. A. N. Combe; Flt. Lt. B. K. Burnett; Sgt. H. B. Gray.

Ismailia, Egypt, to Darwin, Australia. Distance: 11,520.421 km. (7,158.5 statute miles).

Aviators' Certificates

No.	Name.	Club or School.	Date
16,684	John Keighley	Romford	6.12.38
16,685	Claud Osmond Hinks	Lancashire	27.11.38
16,686	Hamilton Richard Flack ..	Norfolk & Norwich ..	24. 9.38
16,687	George Arthur Dvorjetz... ..	Kent	1.12.38
16,688	Ivan Felix Brownfield Parker ..	Thanet	4.12.38
16,689	George Hayles Skipper	Hampshire	5.12.38
16,690	Denis Tremaine	Hampshire	3.12.38
16,691	Mary Elsie Heriette Hebden ...	London	14.11.38
16,692	Charles Plumridge	Surrey Flying Services ..	18.10.38
16,693	Robert George Parker	Edinburgh	27.11.38
16,694	John Staughton Messent ..	Redhill	29.11.38
16,695	Neil John Mackay	Romford	4.12.38
16,696	Arthur Edward Garaway ..	Weston	6.12.38
16,697	Charles Leonard Ward	Witney & Oxford ..	5.12.38
16,698	Hennie Beyers	Witney & Oxford ..	11.11.38
16,699	Roy Woolley	Hampshire	8.12.38
16,700	Robert Algernon Rokeby Coote-Robinson.	Portsmouth	8.12.38
16,701	Dories Lexey Margaret Lindner	Herts & Essex	8.12.38
16,702	Terence Alfred Coggan	Herts & Essex	2.12.38
16,703	John Robert Tustin	Kent	8.12.38
16,704	Leslie Dennis Roper	Cambridge	22.11.38
16,705	Henry Colin Durrant	Cambridge	20.11.38
16,706	Ernest Augustus Holmes Bacon	Cinque Ports	9.12.38
16,707	Basil Philip Waterlow Clapin ...	University	22.11.38
16,708	Thomas Richmond Mandell Creighton.	University	6.12.38
16,709	Charles Edward Pennell... ...	Malling	9.12.38
16,710	Richard Evelyn Flower... ...	No. 21 E. and R. F.T.S. (Stapleford).	5.12.38
16,711	Oswald Sedgwick Buglass ...	Border	9.12.38
16,712	Harold Leslie Powell	Southend	22.11.38
16,713	Anthony St. John Bunker ..	Southend	1.12.38
16,714	Moira Sheilah Hall-Reader ...	Southend	7.12.38
16,715	Vannio Max Albrecht	Southend	11 12.38
16,716	Harold George Leates	Southend	13.12.38
16,717	Theodore Dudley Misselbrook ...	Norfolk & Norwich ..	10.12.38
16,718	Gerard Ralph Colvin Yates ..	Romford	7.12.38
16,719	John Carlton Speer	Romford	6.12.38
16,720	Frank Sherwin Green	Romford	29.11.38
16,721	John Miall Coxall	London Air Park... ..	11.12.38
16,722	George William Milson	Grimsby	2.12.38
16,723	Archibald Gordon Friend ...	Redhill	5.11.38
16,724	Roy Thomas Brookes	Redhill	28.11.38
16,725	Patrick de Courcy Festing-Smith	Surrey Flying Services ..	6.12.38
16,726	John Rauthmell Thomson ...	Brooklands	27.11.38
16,727	Elizabeth Yorke	Edinburgh	10.12.38
16,728	William Bryan Henn	No. 10 E. and R. F.T.S. (Yatesbury).	21.11.38
16,729	Thomas Thornton Miller ...	No. 10 E. and R. F.T.S. (Yatesbury).	10.12.38
16,730	Cyril Lewis Whitnell	Reading	6.12.38
16,731	Percy Eric Hindmarsh	Herts & Essex	12.12.38
16,732	John Hawes Balmer	London	8.12.38
16,733	Archibald Murchie Macleod ...	Civil Service	4.12.38
16,734	Ernest Graham Dunsford ...	Civil Service	11.11.38
16,735	Alexander Edward Head ...	Civil Service	3. 9.38
16,736	Kenneth William Chapman ...	Civil Service	20.11.38
16,737	Kenneth Edmund Witton ...	Surrey Flying Services ..	12.12.38
16,738	George Francis Ashby	London Transport ..	12.12.38
16,739	Joan Holcroft Green	Bournemouth	14.12.38
16,740	George Edward Carrington Seale	Bournemouth	14.12.38
16,741	George William Read	No. 16 E. and R. F.T.S. (Shoreham).	14.12.38
16,742	Thomas Rex Walker Froud ..	No. 9 E. and R. F.T.S. (Coventry).	14.12.38
16,743	Joseph Edward McCormick ...	Yapton	14.12.38

C.A.G. HEART-CRY

(*Continued from page 594*)

Not unnaturally I was inclined to blame the Civil Air Guard Commissioners for this rather chaotic state of affairs. Recently, however, we had one of the Commissioners down to address us, amid considerable enthusiasm, and I must admit that he seemed to be talking sound commonsense, giving the impression that he would probably talk to the Air Ministry just as straight as he talked to us. He warned us, for example, that flying a Service aircraft was a very different proposition from flying a light aeroplane, and that in most directions we couldn't hope to get to a higher standard than the Service elementary standard for pilots; also that not all of us could hope to reach the high standard of physical and mental fitness required for an R.A.F. pilot. On the other hand, we were getting over the most troublesome stage of flying training, which needed good weather and a horizon, and which couldn't be hurried without running the risk of heavy training losses. Therefore, in an emergency those of us who were suitable in other respects would be saving many weeks of valuable time in connection with our training. He also warned us that we couldn't expect the R.A.F. to take us on trust, and that we had got to prove our worth in the matter of keenness, ability and discipline.

All that seems to me sound sense, but if it represents the views of the Commissioners, why can't we have a definite statement to that effect either from them or from the Air Ministry? And why can't we have a more uniform scheme applied to all the units?

I feel a bit ungrateful for grousing like this, because I and my fellow C.A.G.s have so much to be grateful for in the way in which from many points of view the clubs are looking after us and helping us on. I hope that no club member who reads this will feel that we don't appreciate all that's being done for us. All we ask is that whoever is the supreme authority shall make up his mind as to what he wants us to do and give us the opportunity of getting on with it.

THE CATAPULT

Some Notes on a Widely Used Modern Type

THE aircraft catapult, mounted singly or in numbers on a warship, may be regarded as an essential accessory of any truly modern navy. Moreover, in a suitably developed form it may have some application in the launching from land bases of transport machines or bombers with excessive wing loadings, though so far its commercial use has been limited to the experimental services from the floating aerodromes of Deutsche Lufthansa, which company standardises the famous Heinkel catapult. A comparatively recent development is, of course, the launching of wireless-controlled target aircraft.

The design of a catapult for naval use is an undertaking of some magnitude, for the device must be compact and at the same time give a smooth acceleration, which, of course, is rendered difficult in view of the limitations of space.

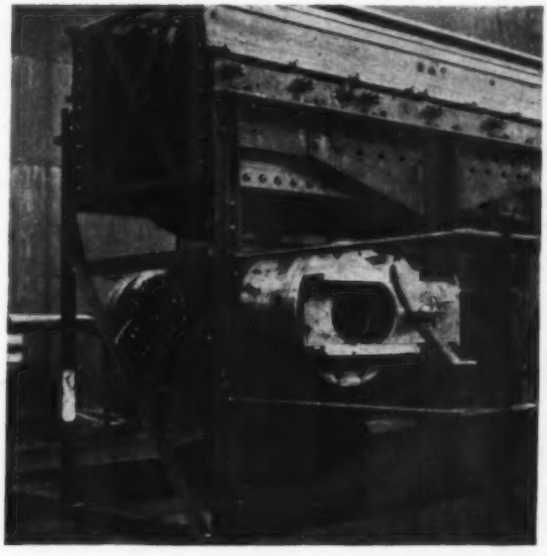
The catapult must be easily trained and operated within the confines of a cruiser's deck and should have a low relative weight. Ransomes and Rapier, Ltd., have been building catapults since early in 1925, and to-day they are supplying not only the British Admiralty and Air Ministry but a number of foreign Governments. A recent batch—specially adapted for use with Grumman seaplanes—has been delivered to the Argentine.

The "Slider" Catapult

On a recent visit to the company's Ipswich works we were fortunate enough to have the guidance of Mr. R. S. Lewis, the chief engineer, who explained that the Ransomes and Rapier catapult in its present form was developed from a design patented by the British Admiralty. Its chief characteristic (and one which is responsible for its name, the "slider" catapult) is a sliding member which is provided with a roller-bearing track and is made to travel along the main structure by a ram and a system of wire ropes over pulleys (to multiply the action), the launching carriage proper moving forward on top of the sliding structure. The two-stage impulse ensures that the speeds of the trolley in relation to the sliding member and of the slider to the main girder are comparatively low, although the actual launching speed is amply high. To put it simply, doubling the distance halves the acceleration. Additionally, the tracks have neither breaks nor joints. The main girder structure is pivoted at its centre and revolves on a circular race rail, movement being controlled from a platform at the side. The operating gear for training may be worked by hand or power.

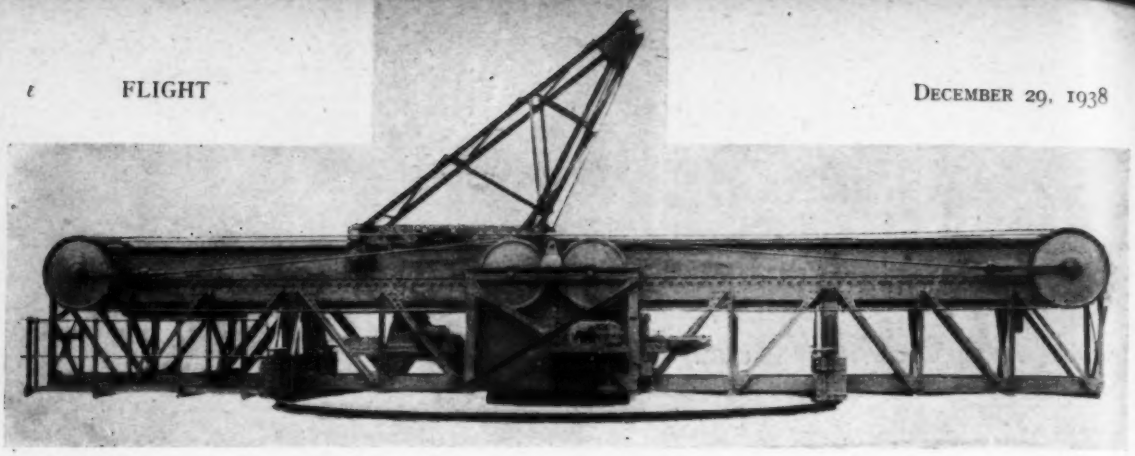
Within the main girder

A Supermarine Walrus the instant after leaving a Ransomes and Rapier catapult.



The breech end of the catapult when equipped for using cordite as the motive power. Compressed air is an alternative medium.

Testing the catapult supplied for a cruiser for the Argentine Navy. The weight corresponds to that of a Grumman seaplane.



A large Ransome and Rapier "slider" type catapult, showing the layout of the turntable, the system of wire ropes and the launching chassis.

structure is the power unit which effects the launch. This may be achieved through the combustion, in a breech somewhat similar to that of a gun, of a charge of cordite (which has suitable slow-burning qualities) or by compressed air, delivered through special smooth-working valves from high tensile steel bottles. Both methods are in use in the British Navy, and frequently catapults are delivered with interchangeable breeches, permitting either method to be employed.

In order that the launching trolley shall be brought to rest smoothly after the launch has taken place, hydraulic retardation gear is fitted at the forward end of the cylinder. On the catapult itself is a release hook arrangement which ensures that the catapult is held up until the actual moment of starting. The pull of the aircraft engine alone will thus not influence the catapult, but when combined with the launching power a caliper arrangement is opened, permitting the launch to take place. The legs of the trolley which support the aircraft are arranged to collapse as it leaves in order to clear the tail of the aircraft. These legs engage at their upper ends with spools located at suitable points on the fuselage or hull of the aircraft.

Current Ransomes and Rapier models accommodate aircraft from 3,000 to 7,500 lb., covering a range of machines from the Fairey Seafox light reconnaissance type to the large Walrus, Shark and Swordfish. The smaller types launch at 58 knots and the larger at 50 knots. Mean acceleration varies, being as high as 3½ G, though the Admiralty normally calls for a figure of 2¼ G.

"Flight" photograph.

Adjusting one of the roller bearing tracks of a "slider" catapult.

Testing is done at the Ipswich works by hurling a massive cheese-shaped weight into a bed of sand. The Service conducts experiments with obsolete floatplanes ballasted with concrete.

REAL STALL WARNING

AT one time or another numerous people have invented devices which were intended to give the pilot full and thorough warning of an impending stall. Some of them have worked quite well, but have only indicated what may be described as a "simple" stall, and not the possibility of one at a particular point or as a result of a high angle of attack. Nobody is ever caught out by a straight stall, but only by one which occurs unexpectedly, as a result of unusual circumstances.

A new device with useful possibilities has been developed and tested by the National Advisory Committee for Aeronautics in the United States. It consists of a small prism-shaped "sharp-edge" to be fixed to the leading edge of the wing, with a modified type of pitot head which communicates with an air-pressure cell fitted with electrical contacts for giving any required aural or visual warning.

The indicator operates on the principle that a local stalling condition occurs at the leading edge near the wing tip at a lower angle of attack and at a higher air speed than that over the main portion of the wing. The condition results from disturbance of the airflow and a decrease in air pressure at the localised point. In utilising this fact, the "sharp-edge" is fixed over a short span of the leading edge to produce an artificial localised stall in front of the pitot pressure head, which is mounted directly behind it. The electrical contacts in the pressure cell are adjusted to maintain a gap at a certain air pressure, but any abrupt drop caused by a localised stall results in the closing of the circuit and in the consequent provision of an immediate warning to the pilot.

The principle (which has been fully tested in a Fairchild 22 with Zap flaps) can be applied to different parts, but the pressure unit must be rugged enough to withstand pressures much greater than the dynamic pressure produced at the maximum speed of the machine relative to undisturbed air, since, in normal circumstances, the velocity at the pressure head is considerably greater than the airspeed of the machine. The indicator can be adjusted to function through a considerable range by altering the shape and size of the "sharp-edge" and the nose of the pressure head.

Two such heads and sharp-edges will, in general, be required, one near each wing tip, to take care of the difference of 5 to 6 deg. in angle of attack on the tips when in a turn. Presumably, the formation of ice on the "sharp-edge" might cause the head to indicate a stall at a somewhat lower angle of attack than usual, which would be desirable since ice on the wing would tend to produce a stall at a higher speed or lower angle. Whatever type of head is used, a heating element and suitable water drains should be provided to prevent rain and ice from interfering with proper functioning of the device.

The particular advantage of this type of stall warning device might be in application to highly manœuvrable fighters and similar machines, some of which stall inadvertently and without warning in various manœuvres at speeds varying from the theoretical stall to about two and one-half times this speed, according to rate of acceleration. The stall-warning indicator, it should be explained again, depends upon angle of attack rather than on airspeed.

FLIGHT.
DECEMBER 29, 1938

The ODD DROP

Some Recollections of a Professional Parachutist

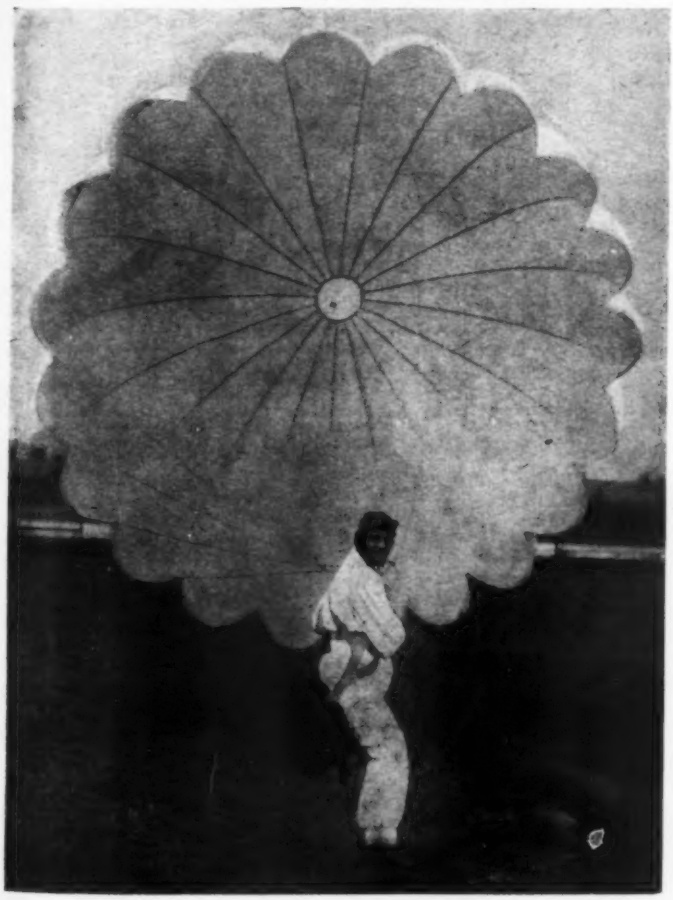
By BENNO de GREEUW

A striking photograph that conveys the tenseness (usually felt by everybody but the parachutist himself) just before the jump. It shows the author about to make his first professional jump, and from a low altitude, at Coventry in 1932.

SO many people still seem to consider the parachute an extremely unreliable apparatus, liable to open occasionally, perhaps, but usually to be used only by people with a suicidal outlook, that I think a few of my experiences as a parachutist may induce more confidence in those who carry these devices.

In writing this I am dealing mainly with what I call "the odd drop," that is, those instances when a parachute might have failed but did not, and when a landing might have been worse than it was, and also any drops out of the normal run.

My parachuting experiences began with an unintentional 1,000ft. delayed drop at Woodley Aerodrome, Reading, in 1932. Like the majority of parachutists, I had, up to the time of my first jump, done very little flying; actually, it was my fourth flight and, as you may imagine, the trip itself was a novelty quite apart from the jump. Consequently when the moment came to leave the machine I was somewhat scared. However, I left with my eyes shut, heart in my boots and hand very much on rip-cord ring, which I pulled as soon as I dared. At first I felt a slight tug and thought the 'chute might have opened, so took a look round—to find, to my astonishment, that I was falling flat and face downwards and describing circles, which made me fling my arms out, so performing a sort of breast stroke in mid-air. Immediately there was a bang, and I came to a sudden stop. The 'chute had opened. On looking earthwards I thought that there did not seem a lot left of 2,000ft., but not then really having much idea of height I let the thought pass to concentrate on my landing, which was into a gravel quarry amidst some workmen. On reaching the aerodrome I was informed, much to my surprise, that I had fallen a good 1,000ft. with a little piece of parachute out behind me; the actual description given was "with the tail of your shirt hanging out!"



Benno de Greeuw and his 26ft. seat-pack G.Q., with which he has made 124 jumps in 5½ years.

Experientia Docet

What had happened was that I had not pulled the rip-cord ring far enough; on the Russell "lobe" parachute, which I was then using, the ripping simply consisted of pulling the pack cover off the canopy, which came away under one's left arm with the rip-cord wire. I had my arms in close to my body, and at first only pulled the wire through, so letting only a portion of the canopy out; my "breast stroke" eventually cleared it. So on my first drop not only did I learn in reality that "ignorance is bliss," but also that a parachute may give you an odd drop but not necessarily the last drop.

My next experience of unorthodox opening came in 1933, when on tour with an air display in Scotland. I had left a Lynx Avro at 1,000ft., fallen about 200ft., and ripped. The first tug at my shoulders came all right as the canopy streaked out above me. Then followed my first real experience of that never-to-be-forgotten feeling, as you feel yourself hurtling earthwards and over and over with alternate views of a roof top or other landmark appearing rapidly larger. I looked up and saw my 'chute pulled out full length and looking like a long white sock, following

A descent with an unorthodox type of parachute—the Russell lobe—at Broxbourne in 1933.

me earthwards with no sign of air in the canopy. I hung there helplessly, still hoping for the best, but rather fearing the worst, when, at about 200ft., there was a terrific jolt and a bang, and I came to one of those most welcome full stops. For the first and only time I dropped my rip-cord ring, so surprised was I to see that 'chute actually open.

On inspecting the 'chute afterwards I found that the cause of my delayed opening was a damp canopy; silk, if it is not bone dry, clings together. I had only just joined the display and made a hurried pack on the field without properly inspecting the 'chutes. This taught me a good lesson, namely, to look after my parachute if I expected it to look after me.

It was shortly after this that I started using the now well-known G.Q. parachute, which is a type utilising the auxiliary or pilot 'chute, an all-important addition, as its function is to drag the main canopy clear of your body regardless of position and almost instantaneously.

Sticky Opening

My next sticky opening came in 1934, at Blackpool. I had left an Avro Avian at about 1,500ft., fallen a short distance, and ripped. I felt the canopy streak out with a slight tug, but after that, nothing. I looked up and saw that my canopy was filled with air, but closed at the mouth, with the little pilot 'chute tugging away frantically at the top. What had happened was that one twist had got in my two groups of lines from my shoulders, and this twist, instead of sliding down the lines to my harness in the usual way, had reversed the process and finished up at the canopy, so holding the bottom closed. I immediately saw the way of the twist and turned my lift webs accordingly, which resulted in an instant opening after a delay of about 800ft. Such a twist in the lines is caused by the fact that one's body sometimes spins owing to the way one happens to leave the machine, but on this occasion I think I had also been a little careless with the packing of my lines and left too much slack up the canopy end. Since then I have treated this part of the packing with great respect, and have not had a recurrence.

The most extraordinary luck seems to take place during that sometimes rather hazardous part of parachuting, the landing, which in my opinion is really the worst part of a jump and can sometimes scare you far more than a sticky opening, as you have more time to appreciate the position and the probable results without being able to do very much about it.

My first realisation of the fact that parachute landings can be really hard came on my third jump. I was making a drop for Sir Alan Cobham's Display at Abingdon. It was a windy day and pouring with rain. All went well on the opening, and I looked down to find myself drifting rapidly towards a sand-pit in the next field, and so, not then knowing anything of parachuting technique, I tucked in my head, shut my eyes and waited for results. I soon got them—a hard bang on the back of my head and a couple of back somersaults. I had made that fatal mistake (which can easily cost you a broken neck) of landing backwards instead of twisting myself around to face my direction of drift. However, I was lucky, as the soft sand in which I landed saved me. Although I had a very stiff neck for a few weeks, I had benefited quite a lot, as I have never repeated the performance.

A railway track was my next point for a hard touchdown, at the opening of Portsmouth aerodrome. I then had not the remotest idea of where one should leave the 'plane, so more often than not I used to miss the aerodrome either by undershooting or hurtling flat out right over it. On this occasion I had done the former. It resulted in many stars being seen, a portion of my head being removed by the track, and many grazes being received from a joy-ride over the cinders before a telegraph pole finally stopped me. I well remember it, as I was so sore I could not sit down the next day and for the only time had to cancel a parachute engagement.

The Bottom Rung

Finishing a descent by ladder sounds a little peculiar, but this happened to me after a drop which I once made at Brooklands. I was demonstrating a G.Q. for Mr. Raymond Quilter, who took me up himself, telling me that he would tell me where to get out. He did so at 3,800ft. I hopped off and opened out, but immediately saw that I was liable to overshoot, and so "slipped" my 'chute practically the whole way down. I successfully traversed the sewerage farm and Vickers' hangar, but could not quite clear Hawker's. I was dumped on to their hangar roofs to roll down the slope into the gutter between two of them. Had it been the other side, I should have rolled off the edge to a 30ft. drop. As it was, I finished up via a long ladder.

Another rather peculiar landing I once made was when on tour with an air display. I had overshot the field and landed in a sports field next door, when somehow my 'chute dragged over the crossbar of a goal-post, and as there was a fair breeze, hoisted me up to the top and held me there until released by the amused and somewhat surprised club members.

One could go on writing about jumps, some pleasant, some humorous, and others not so pleasant, as the game has all its sides. It certainly does offer variety. I have been making demonstration descents for the Portuguese Government at Amadora aerodrome, near Lisbon, on one Saturday and on the following Saturday jumping for a country crowd near Dundee, again on tour with an air display.

Finally, I should like just to deal with jumps for film productions, of which I have made a number. All were great fun, apart from one which gave me the greatest scare I have had.

My first jumps for a film were for Douglas Fairbanks, jun. All went well except that they decided to do them in December, in high winds and hail on the day chosen. The ice caused the Moth from which I was about to jump to "lose" its engine and make a forced landing back at Heston Aerodrome—the first occasion on which I have had the experience of having to get back in an aeroplane in order to make a forced landing. Later on this same day I had to lay my parachute out on the wet ground in order that they could take some ground shots of Fairbanks in the harness. Immediately afterwards I had hurriedly to hang the 'chute in front of the club fire and dash to repack it in not too dry a condition. However, it opened very well.

(*Continued on next page.*)

I was next asked by a film company to do some very low drops, but as their idea of a safe altitude did not agree with mine we compromised on my dropping a dummy with my parachute. It was great fun, by way of a change, to watch my 'chute with a 140lb. dummy dropping from between 150ft. to 200ft. and opening perfectly from that height. It gave me even more confidence in my old G.Q.

At the end of last year the M.G.M. studios were making a film of the R.A.F. in which I was asked to make some descents. One of these was rather novel, in that it was from a kite balloon at Cardington Aerodrome. At a height of 1,800ft., swaying about in a little basket, I noticed a vast difference as compared with an aeroplane. Although there was still no actual impression of height, the whole thing seemed far more cold-blooded and was impressive in its silence. Also, it was very intriguing to 'phone down to the ground crew asking to be moved, and then seeing, as it appeared from that height, the little toy Fordson with the winch begin to move, to be followed a few seconds later by the balloon.

With me in the basket was the late F/O. Swann, who said that when I left he expected to ascend with a leap for 100ft. or so—and also that, as he was not too keen on watching me leave, he would be glad to get it over. I took the hint and decided to go overboard, so, sitting on the edge of the basket with my seat-pack parachute outside and legs inside, I asked F/O. Swann to give me a push.

I promptly fell off in a back somersault. The most noticeable difference was that one felt the drop and increasing speed; also, one heard the air begin to whistle past and one seemed to fall faster than from a 'plane; possibly this was due to the fact that one had no forward speed as is the case when dropping from an aeroplane. In fact, although I only delayed about 600ft., the opening was so violent that it tore off all the shroud-line tapes inside the pack. I went down to a very nice landing, thus ending a most interesting experience.

Jumping in Formation

Another shot for this same film was to be of eight parachutists dropping from a machine above the clouds, opening out immediately, and disappearing into the clouds with parachutes open. For this event another parachutist, Miss Heron-Maxwell, was also engaged, and six dummies with parachutes were borrowed from Henlow and suspended in the old Vickers Virginia which we were using. It was a very cold September morning, and, as the Virginia has no rocket-like climb, we were both blue with cold out on our wing-tip platforms when, fifty minutes after leaving Netheravon Aerodrome, we managed to find some suitable clouds at 8,000ft. I watched Miss Maxwell and her three dummies open out and disappear into the clouds. Soon after, I saw my three dummies go, and so hurriedly left myself. No sooner had I got my 'chute open than I sank into the clouds, to break through a minute or two later to find myself hanging in space about 7,000ft. up. It is a wonderful feeling; if you do not look up at your canopy you get an impression of just standing there. I sailed down into a cabbage patch, and when I had collected my 'chute I found a farmer shouting at me; apparently he thought that my three companions, the dummies, were either dead or at least unconscious, as they had not got up!

It was during another part of this film, when making what should have been an ordinary drop, that I had what has been, perhaps, my narrowest escape, and which happened, as these things do, in an entirely unexpected way. I was using an Irvin training outfit borrowed from Henlow. This consists of a 28ft. back pack and an emergency 22ft. breast pack combined on the one harness, and as I do not normally wear a breast pack I was inclined to treat it as unnecessary, laughingly remarking to the Airman who fitted me that "I had better look and see where the rip-cord ring is"—a remark I had good reason to remember shortly afterwards.

The fun began when I started to climb out of the back cockpit of the machine, a Fairey IIIF. I was half out when my right foot got wedged under a ledge inside. And there I was, with my left leg outside and unable to move owing to the weight of the two 'chutes holding me out in the slipstream. Eventually, the Flight-Sergeant who was in the machine with me looked round to see why I had not gone. On seeing the trouble, he freed my foot and I fell off, but just managed to catch hold of the cockpit edge. However, the effort to get back was too much for me, and my companion could not manage it; so there I was at 1,100ft., well past the spot over which I should have left and hanging helplessly from the machine. I soon had to leave go and fell off, with both arms right above my head. I went into back somersaults. On this 'chute that I was using the rip-cord ring was of an obsolete type, being round in shape, and placed in a most awkward place up near the left collar bone; also, the breast pack harness came over it, making it difficult to see the ring. The fur collar of my Sidcot suit blew in my face, so there I was, turning over and over and falling rapidly faster, making frantic clutches with a clumsy gloved hand to find the rip-cord ring, but without success, as I could neither feel nor see it.

Uncomfortable Thoughts

It is of an occasion such as this that one retains most vivid impressions; mine are of alternate views of green grass with the sun shining on it, and of the blue sky, with an awful feeling that your end is approaching and yet does not seem possible.

Suddenly I remember the breast pack. Why did I not think of it before? Almost automatically I find and pull its rip-cord ring. What a relief to see the instant flash of white silk as the canopy streaks out and catches the air, so bringing my plunge earthward to a full stop at a height of only about 80ft., or about two seconds from the earth if I had carried on!

My next thought was that I was very likely to break something with only a 22ft. canopy, so I then found the elusive rip-cord ring and ripped the back pack; the canopy of this just flopped down as I reached the ground, to land like a feather without even a scratch. In the sudden stillness the few unpleasant preceding seconds seemed unreal, but it did feel good to be alive!

In connection with this last descent it may be of interest to know that the parachute which saved my life was over twelve years old, being one of the original Irvins made in America, which is pretty good going for a piece of Jap silk, and good proof of a well-known parachute. My own 26ft. seat-pack G.Q. parachute is now 5½ years old; it was originally made for and taken on the Houston Everest expedition; since then I have used it for 124 drops throughout the country. It is now, unfortunately, nearly worn out, not through jumps, but mainly owing to its being dragged about and having to be packed on all sorts of unsuitable places when on tour on air displays.

In conclusion, I should like to say to those who one day may have to do a jump, don't hesitate, it is not half so bad as you might think, and may you have a rapid opening and soft landing!

Forthcoming Events

JANUARY, 1939.

Sun., 1st.	**Bedford School of Flying: New Year Party.**
Wed., 4th.	**R.U.S.I. Lecture: "Psychological Effects of Bombing," by Dr. F. B. Strauss, M.A., D.M. (Oxon.), M.R.C.P. Royal United Service Institution, Whitehall, 5 p.m.**
Tues., 10th.	**R.Ae.S. Isle of Wight Branch Lecture: "Recent Research on Seaplanes," by H. Mason Garner M.A., F.R.Ae.S.**
Thurs., 12th.	**R.Ae.S. Yeovil Branch Lecture: "Retractable Undercarriages," by R. H. Bound.**
Thurs., 12th.	**R.Ae.S. Portsmouth Branch Lecture: "Recent Progress in German Aircraft," by B. S. Shenstone, A.F.R.Ae.S.**
Fri., 13th.	**Coventry R.A.F.V.R. Annual Supper Dance, Drill Hall, Coventry.**

FEBRUARY.

Wed.—Fri., 1st—3rd.	**Aerodrome Owners Association: Airports Conference and Exhibition.**
Fri., 24th.	**York and Leeming Flying Club: Annual Ball, Harrogate.**

COMMERCIAL AVIATION

THE WEEK AT CROYDON

"A. Viator" Makes Invidious Comparisons, Protests About Protests, and Offers Bad Cold-Weather News

ONE day recently a Channel boat spent 19 hours trying to get across and, finally failing, had to heave to (the passengers heaved, too) off one or other inhospitable coast. It is to be hoped that the food did not give out and that the bar was not left with nothing but cocktail sticks and a half-bottle of Angostura. One visualises some ancient mariner, with a beard like a pêche melba along o' the snow and ice, attempting to shoot an albatross (though it is the close season for *Frobisher* and *Falcon*) as some sort of substitute for a Christmas dinner.

Meanwhile (to stress the still-not-always-obvious) how many commercial aeroplanes, full of warm, contented passengers, crossed the Channel during those 19 hours? At least 20 in each direction, I suppose, for practically every service ran to schedule during that period. Not that we do not have our bad days, too, but they are less frequent.

Indignation Meeting

Funny to read about the internal airlines licence hearing, which seemed to consist largely of people representing rival interests popping up at the back of the court and protesting violently (on grounds far from clear even to the protester) to each and every suggestion put forward by anyone else.

The railways protested pretty hotly in some cases and have my sympathy. They were the lads who, some time back, hotted up an express train for the London-Glasgow run and then sent their own air service from London to Glasgow via Belfast, thus proving how easily rail can outstrip air.

The very old gent at the conference, who, when warmed up by sitting with his spine on the hot pipes, entered a powerful but largely inarticulate appeal, was understood to represent the canals. These, when not frozen, have, he said, as much right to live as air transport. Paddle steamers and velocipedes were also represented, no doubt, hence certain croaking noises that most people mistook for rodents in the wainscot or flitter-mice in the belfry above.

Why does not someone invent a more aesthetically pleasing colour for de-icing paste? Machines look as if they had been wallowing in a mud-hole, whereas if the paste were silver-coloured it would be more or less unnoticed.

Air Taxi's, I see, have a smart new red and silver Percival Q.6 on tap at the Airport, Croydon. It cruises at about 186 m.p.h. with a retractable under-carriage, and should be a very useful type for fast charter work. Somebody tells me that it has been loaded up with mails and dashed to Alex and back, passing, with monotonous regularity, some of the other craft on the job.

Falcon and *Frobisher* both left Croydon with a ton and a half of mails apiece bright and early on Sunday morning, December 18. *Falcon* had Capts. E. R. B. White and Jeffries aboard while *Frobisher* was manned by Capts. Oliver and Wilkins.

Swissair recently brought a consignment of hares to Croydon. Coals to Newcastle; hares to Croydon. Croydon is thick with hares, and a spot of brisk taxying with a tricycle undercart machine ought to provide something well worth jugging at any time.

A British Airways Junkers Ju. 52, complete with tractor, was caught by the cold snap standing out in the open. The tractor burst a cylinder, but the Junkers never so much as winced. Item: Wish I had an air-cooled car in these outrageously seasonable times. Why, even my own favourite pipe, a straight-grained briar, got frozen up and I had to call in a plumber.

One well-known airport character turned up on the tarmac during the cold spell in large ski-boots, complete with socks—nor did he altogether escape the comments of the bystanders. "You ought to have heard him marking time, to 'ide the things," they said.

Real Service

EARLY in the New Year a new Flying Doctor medical base will be established at Alice Springs. This is the last of six such bases to be set up in Australia, and from these practically the entire Continent is covered.

The latest base will be run in connection with a hospital which the Commonwealth Government have recently erected at this point. The other five bases which are at present in operation are at Cloncurry, Wyndham, Port Hedland, Kalgoorlie and Broken Hill. During last year five doctors covered nearly 75,000 miles by air from these centres.

Eighteen

FIVE more Imperial Airways pilots, including Captain D. C. T. Bennett, who recently flew *Mercury* to South Africa, recently became Second Masters. At present this is the highest distinction obtainable by a civil pilot.

Altogether eighteen Imperial captains carry this designation, which is awarded after long experience of flying marine and land aircraft both by day and by night, and requires the possession of a First-Class Navigator's Certificate, Ground Engineer's Certificates in two categories, and the P.M.G.'s radio operator's licence

YESTERDAY AND TOMORROW IN NEW ZEALAND

One of Union Airways D.H. 86s flying over Blenheim where New Zealand's first aero club was formed.

Yesterday and Tomorrow in N.Z.

THE New Zealand Postmaster-General recently celebrated the return to power of the Labour Government with the announcement that the Tasman air-mail service, the last link in the Empire route to the East, will start next February. The machines to be used will be the new high-payload Short boats, three of which have already been named to suit their purpose.

This announcement is the climax of a series of rapid developments in New Zealand, where flying is a very modern affair. Admittedly, the Walsh brothers started the N.Z. Flying school in Auckland in 1915, and were followed by the Canterbury Aviation School in the following year. These two firms pioneered charter flying and training and the Armistice found them flourishing.

Until 1923 these companies carried all N.Z. commercial flying. They gave New Zealand two key men—Capt. G. Bolt, now technical adviser for Cook Strait Airways, and Capt. J. C. Mercer, now managing director of Air Travel (N.Z.) Ltd. Modern commercial flying dates from 1927. In that year Goodwin, Chichester, Bolt and Sqn. Ldr. Steadman formed a new company which braved the complete lack of adequate landing facilities. But it can be said Sqn. Ldr. MacGregor really made New Zealand aviation. He worked hard in creating interest, and forced official attention. Kingsford-Smith's U.S.-Australia flight occurred at the psychological moment.

In 1931 a company formed by Sqn. Ldr. MacGregor started a service between Christchurch and Dunedin, with weekly return trips—using a D.H.50, flown by MacGregor himself. The latter's work in the Napier earthquake roused further public interest to such an extent that three trips were made a week. In that year, too, he flew mails from Invercargill to Auckland to connect with a steamer and so with the experimental Australia-England service.

Not until 1933, however, did the Government announce its scheme for a chain of landing grounds—a scheme which was primarily intended for defence purposes, and to-day none of the operating by companies is more than five years old. On March 16, 1936, Union Airways' three D.H.86s started to carry mails and the rest is recent history. With Union Airways are Air Travel, the pioneer company, East Coast Airways and Cook Strait Airways. Next year their services will be connected by air with Australia, India and this country.

And Now the D.C.5

POTENTIAL customers have received specifications of the Douglas D.C.5 sixteen-passenger twin-engined high-wing monoplane, which has a tricycle undercarriage and is designed for feeder-line use. The prototype should be flying by February 15 next year.

Back to the old formula? An artist's impression of the D.C.5.

Data are: Span 78ft. (the D.C.2 is 85ft.); wing area 825 sq. ft.; wing loading 22.1lb./sq. ft. (rather higher than that of the D.C.2); gross weight 18,250lb.; and cargo capacity 272 cu. ft. The engines may be either Wright Cyclone F.62s or G.2s, or Pratt and Whitney Hornet S1E—2Gs. Using the G.2 Cyclones, and tanked for a range of 800 miles, the new Douglas will cruise at 203 m.p.h. on 75 per cent. of its power and will carry twelve passengers with baggage and 576lb. of freight and mail. The useful load is actually given as 6,750lb.

This machine will make an interesting comparison with the De Havilland Flamingo.

Rebuilding at Renfrew

IN spite of the rumours and statements to the effect that a new civil centre is being considered for the use of Glasgow, the Air Ministry is to go ahead with the erection of a much-needed control building at a cost of more than £3,000. Evidently there is no likelihood that a change-over will be made within the next two years, and certainly, if a totally new site is being considered, it will be almost as long as this before it is ready for use.

Brazil and China

THE Viacao Aerea São Paulo (V.A.S.P.), which already operates services from São Paulo to Rio de Janeiro and the new capital, Goyania, of Goyaz, has now started a service from São Paulo to Curityba, the capital of the Parana State. The service is flown by Junkers Ju.52s and connects at Curityba with those of Aerolloyd Iguassù.

On October 5 a regular service was opened between Tokio, Peking and Nanking. Lockheed Electras, Douglas D.C.3s and D.C.2s are being used, the first on the Tokyo-Fukuoka-Tsingtau-Peking section and the latter two on the Fukuoka-Nanking stretch. The service leaves Tokyo in the morning and reaches Nanking or Peking before dark.

COMMERCIAL AVIATION (CONTINUED)

All-up by K.L.M.?

IN a report recently issued by the Netherlands Post Office a unification of postal charges on the K.L.M. Far Eastern route is proposed, and negotiations to this end will shortly be started with the British and French authorities. During this year two officials of the office have been investigating conditions along the K.L.M. Far Eastern route and conducting negotiations with the various postal administrations on this line.

Aeromaritime's Fifth S43

AEROMARITIME, who operate the weekly 3,100-mile mail and passenger service from Dakar to Pointe Noire in co-operation with the Air France's Toulouse-Casablanca-Dakar service, have placed an order in America for another eight-passenger Sikorsky S.43 amphibian.

This brings the fleet of S.43s used by this concern to five. The service was inaugurated in March last year with three and another was added a year later. Air France in London have booked a large proportion of the through passengers on this service, which provides the quickest way of reaching the Gold Coast.

Air Mail Pioneering

ALTHOUGH Allied Airways are now entrusted with the mail contract to the Shetlands, the northern section of Scottish Airways still carries the mails to the Orkneys and this mail service has just completed four years of operation. It was on May 29, 1934 (a little more than a year from the time when the Inverness-Orkney service was started) that Highland Airways, under the management of Capt. Fesson, started to carry the mails, and a permanent contract was awarded on November 30 of that year.

During last year, operating now as Scottish Airways, the company has carried eighty tons of mail—as compared with ten tons carried during the first six months of operation. The regularity, too, has been of the hundred per cent. order—a feat which has been made possible by the fact that D/F radio stations are available at the base, Inverness, and at Kirkwall and Shetland. In due course it is to be expected that Allied Airways will have the same assistance at Dyce, Aberdeen.

New Zealand Trophy

A £250 trophy for the promotion of safety in the air and the greater efficiency of machines has been donated by citizens of Auckland, New Zealand, in memory of Capt. Edwin Musick and his six companions who were lost in the *Samoan Clipper* in mid-Pacific last January on the first commercial flight from the United States to New Zealand.

The trophy will be awarded annually to the individual, group or body within the United States of America and the British Commonwealth of Nations which, in the opinion of the committee, makes the most valuable contribution towards the safety of life in the air—with especial regard to transoceanic flying development. The committee's decision will be guided by advice from the Institute of Aeronautical Sciences of the United States and the Royal Aeronautical Society of Great Britain. A replica will be provided each year to be retained by the winner. The award is to be made every January.

The award committee is a representative one, consisting of those who, for the time being, hold office as Mayor of Auckland, chairman of the Auckland Harbour Board, president of the Auckland University, chairman of the Chamber of Commerce and senior stipendiary magistrate.

More Lockheeds for the East Indies

PRESUMABLY for work in connection with the opening up of New Guinea, the Colonial Department of the Netherlands East Indies have placed an order for twelve Lockheed Twelves.

These machines will each be fitted with two Wasp Junior S.B. engines of 450 h.p., and will, consequently, have a higher top speed than any other examples of the same type. This speed is likely to be in the region of 220 m.p.h. The first machine is expected to be delivered late in January next year, and the other eleven will thereafter be shipped over week by week until the completion of the order.

Arctic Experiments

ACCORDING to a statement which appeared in a recent issue of *Izvestia*, the first series of experimental Soviet Arctic flights have now been completed. The machines, which have convoyed ships in the Arctic Ocean, have covered 112,000 miles and have carried about 11,000 passengers, more than 470 tons of freight and about 190 tons of mail. Two of the pilots, Golovin and Orloff, have themselves flown more than 25,000 miles during a six weeks' search for suitable landing areas along the Arctic coast between Cape Wellen and Archangel. A rescue group, consisting of three machines, also saved 148 men—the crew of three ice-breaking vessels which were adrift in difficult circumstances.

Airport Planning

WITH steadily increasing wing loadings the problem of airport size and layout is becoming a difficult one. It has been said that the D.C.4, for instance, can only operate safely with full load from half-a-dozen American airports.

The need for national planning in the layout and of aerodromes is stressed in a pamphlet which has recently been issued by the Public Administration Service in Chicago. Although designed for American consumption, this pamphlet, which is entitled *The Airport Dilemma*, gives some extremely useful facts and figures, including profit and loss data for the British Municipal airports during the period of 1935-1936.

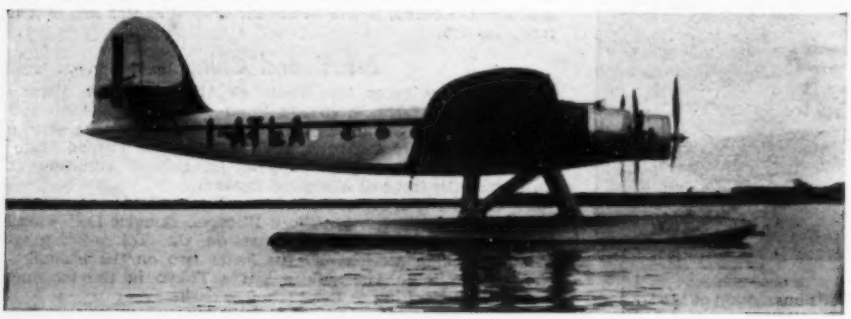
Meanwhile a detailed survey of airports has been started by the new Civil Aeronautics Authority, this survey to form a basis for its report at Congress on the advisability of Federal participation in the development and operation of a national airport system. The Report is due to be submitted before February 1 next year.

Italy's Atlantic Challenger

EIGHT world's records (four over 1,000 kilometres at 403.424 km./hr. with no load, 500 kg., 1,000 kg. and 2,000 kg. and four over 2,000 km. with the same loads at 399.644 km./hr.) have already proved the capabilities of the Cant, Z.509 twin-float seaplane built for mail-carrying over the Atlantic. Fuel tanks in the monoplane wing hold 9,650 litres; as the consumption is about 1.2 kg. of petrol per km. the range is in the neighbourhood of 5,500 km. (3,400 miles).

The fuselage is of elliptical section and is covered entirely with tulip tree wood. There is a robust bottom keel and the system of transverse members includes three special bulkheads to which the wing spars are attached. The engines are of the Fiat A.80 R.C.40 or A.80 R.C.20 type with an output of 1,000 h.p. at heights of 13,100 ft. or 6,550 ft. respectively.

With the fully supercharged Fiats the Z.509 is said to attain a speed of 260 m.p.h. at full power altitude and to climb to 13,100 ft. in 13 min. The machine is similar in layout to the Cant tri-motors already employed by Ala Littoria as passenger carriers and by the Italian Air Force as coastal defence bombers.



The Cant seaplane which recently obtained eight world's records and has been built for Atlantic mail-carrying.

THE INDUSTRY

The Henderson Safety Tank is available in several different types. In the above illustration it is designed to form part of the leading edge of an aircraft. (Right) Bent but not broken: A Henderson Safety Tank after tests in which a heavy iron girder was dropped upon it. Details appear below.

In the Cause of Safety

IT is generally accepted that when an aircraft catches fire after a crash the actual ignition of spilt fuel is not often caused by the fuel itself coming into contact with a hot engine component, but rather by oil, which will flash in contact with hot metal, whereas petrol may merely vaporise. There are, of course, other causes of crash fires, such as short-circuits in the electrical equipment, sparks struck from the ground, or a static discharge, but in many cases fire results from ignited engine oil or grease firing loose petrol or petrol vapour.

For this reason it is clear that if fuel tanks can be so constructed as to withstand impact and distortion in the event of a crash, without bursting, then the risk of a major conflagration is reduced to a minimum.

It was with this object in view that the Henderson Safety Tank Co., Ltd., of 15, York Buildings, Adelphi, London, W.C.2, embarked upon a programme of research and development which, it is stated, began over seven years ago. In co-operation with the Air Ministry, the company has produced various types of fuel tanks incorporating features which are fully protected by patents and pending applications in this country and abroad.

The walls of the Henderson Safety Tank are built up in three layers to a thickness of $\frac{3}{16}$in. The inner wall, of copper sheet, with soldered joints, is coated outside with a thin film of "Hencorite," a substance having many of the properties of rubber. This coating of "Hencorite" is in turn covered with an outer skin of copper sheeting, soldered at all joints as in the case of the inner wall. Each layer of the tank is a complete, leakproof unit. Baffles attached to the inner wall of the tank are secured by a special self-releasing device by which they become detached in the event of a crash, thereby enabling the pressure inside the tank to be evened up.

Soft soldering is employed throughout—there are no rivets. The tanks are rustproof and do not require normalising, and it is claimed that they are leakproof and fireproof when fired at by incendiary, tracer or ordinary ammunition. Damaged tanks are repairable and are impervious to climatic conditions.

The Henderson tank is available in any required shape and has been designed to take any required stress or strain—in one particular case one of these tanks has been built to form part of the leading edge of a wing.

In spite of the tank's triple skin its weight is unexpectedly low—between 1 lb. and $1\frac{1}{4}$ lb. per gallon for capacities of 50 gallons, which is little more than that for tanks employed on modern commercial aircraft.

The Henderson safety tank, it is stated, has successfully passed the drop, firing and flying tests at Farnborough and Martlesham and has been approved for all civil types.

Lodge Research Department

REPEATED extensions to the Lodge sparking plug factory at Rugby have influenced the company to build a new and exceedingly comprehensive research and development laboratory to carry on and extend the experimental work which the existing research department has conducted for upwards of 25 years. The equipment will include specialised machinery for the development and production, in experimental quantities, of aero sparking plugs for all conditions of service.

Not-so-safe Rescue Equipment

AT a recent gathering of A.R.P. experts, Mr. T. G. Bedwell, managing director of Bell's Asbestos and Engineering Supplies (who supply asbestos clothing for R.A.F. rescue squads), called attention to the existence of inferior fire-fighting suits which would imperil the lives of the wearers.

Mr. Bedwell went on to say that, while there were several reputable firms selling equipments at the present time, it was highly desirable, and as much in their interests as in those of the purchaser, that implicit instructions should be given with each equipment specifying exactly the measure of protection they would afford to the wearer. This implied an undertaking by the purchaser that he would abide by these instructions, the manufacturer on his part giving an undertaking that the equipment which he was selling had actually been used and tried in practical conditions and worn by human beings, and not merely subjected to some laboratory test or tested by using a dummy.

Filter Patent Extension Granted

IN the High Court of Justice, Chancery Division, Mr. Justice Simonds recently delivered favourable judgment on a petition for the extension of the term of the basic patent, presented jointly by Stream-Line Filters, Ltd., and Dr. H. S. Hele-Shaw.

Mr. Trevor Watson, K.C., pointed out that the invention (concerned with the reconditioning of used oil) was being used by the Royal Air Force, the Admiralty, the Central Electricity Board and other public bodies. It was further stated that the lubricating oil consumed in this country, amounting to an annual total of 150,000,000 gallons, had to be imported from abroad, and as the filter enabled the impurities to be efficiently separated, from 95 to 97 per cent. of good oil still remaining, this resulted in a substantial measure of public economy, a matter of national importance.

Mr. Justice Simonds, in the course of his judgment, said that the patent relating to the material used for filtration showed great utility to the public. It was of real importance that, by the use of the invention, lubricating oil could be used over and over again at a cost which could be regarded as trivial, having regard to the saving effected. There had been no undue delay in exploiting the patent, and a sum of £70,000 had been expended for that purpose. Stream-Line Filters, Ltd., now appeared, from the balance sheet, to be in a strong position to market the invention.

His Lordship said that he was justified in making a regrant for a term of five years from date of the expiration of the second patent.

THE INDUSTRY (CONTINUED)

NEW COMPANIES

In the notes below, for reasons of space, the "objects" of new companies are usually somewhat abbreviated.

ARNELL-WOOLER AERO DIESELS, LTD.—Private company, registered November 17. Capital, £100 in 100 shares of £1 each. Objects: To devise machines and materials of any kind applicable to aviation, and to carry on the business of manufacturers and suppliers of and dealers in aircraft, engines, Diesel engines, and aviation appliances, etc. The directors are: Richard S. Arnell (permanent chairman) and John Wooler. Registered office: 255, West End Lane, London, N.W.6.

AIVAZ ENGINEERING COMPANY, LTD.—Private company, registered November 19. Capital, £6,000 in £1 shares. Objects: To adopt agreements (1) with Jacques Aivaz, (2) with Thomas P. Headland and (3) with Cyril Rose; and to carry on the business of manufacturers of petrol tanks, oil and water radiators and other accessories for use in the aircraft, motor and other industries, engineers' tools, etc. Registered office: 164-168, Westminster Bridge Road, London, S.E.1.

EAGLE COMPONENTS CO., LTD.—Private company, registered November 19. Capital, £100 in 100 shares of £1 each. Objects: To manufacture aeroplanes, components and accessories, etc. Ernest J. Newns (director of Eagle Coachworks, Ltd.) is a first director. Registered office: 69, High Street, Walton-on-Thames.

AIRCRAFT ACCELERATORS LTD.—Private company, registered November 26. Capital, £100 in 100 shares of £1 each. Objects: to carry on the business of aeronautical experts and consultants, manufacturers of accelerating mechanism and apparatus for the acceleration, lifting and propulsion of aeroplanes, seaplanes, flying boats, etc. Nicolas Sandor is permanent managing director and chairman. Solicitors: Crane and Hawkins, Bush House, Aldwych, London, W.C.2.

CROUCH-BOLAS (AIRCRAFT APPLIANCES) LIMITED was registered as a private company on November 29 with a nominal capital of £125,000 in 125,600 ordinary shares of £1 each. The objects are to acquire certain patents for inventions relating to aircraft, to adopt an agreement between H. Bolas and R. J. G. Crouch of the first part, Crouch-Bolas Incorporated of the second part, W. Watkins and Aircraft Exchange and Mart, Ltd. of the third part and this company of the fourth part, and to carry on the business of designers, manufacturers and constructors of and dealers in all kinds of aircraft, amphibious craft and vehicles, etc. The first directors are to be appointed by the subscribers. Registered office: 7, Park Lane, London, W.1.

GREAT WESTERN & SOUTHERN AIR LINES, LTD., was registered as a private company on December 5 with a nominal capital of £100 in 100 shares of £1 each. The objects are to establish and maintain air services for the transport of passengers, mails and freight, etc. The subscribers (each with one share) are: John S. Wills, director of companies, and John B. Elliott, assistant general manager, Southern Railway. Solicitors: Wm. Easton & Sons, 43, London Wall, London, E.C.2.

SCOTT LIGHT AIRCRAFT, LTD., was registered as a private company on December 5 with a nominal capital of £5,000 in 5,000 shares of £1 each. The objects are to adopt an agreement with Walter R. Scott and E. P. Zander; and to carry on the business of manufacturers of and dealers in gliders, sailplanes, light aeroplanes, aeroplane parts, etc. The first directors are: The Rt. Hon. the Viscount St. Davids, John A. L. Timpson and Walter R. Scott. Solicitors: Barnett Tuson & Co., 35, New Broad Street, London, E.C.

NORTH-EASTERN AIRCRAFT COMPONENTS, LTD.—Private company, registered November 28. Capital, £1,000 in 1,000 shares of £1 each. Objects: to carry on business as aeronautical experts and consultants, manufacturers of and dealers in aeroplanes, etc. The subscribers are: James White, company director, and Annie M. White. Registered office: Kingsway North, Team Valley Trading Estate, Gateshead.

CO-ORDINATED INLAND AIRWAYS, LTD., was registered as a private company on December 9 with a nominal capital of £5,000 in 20,000 shares of 5s. each. The objects are to establish and maintain lines of aerial connection by means of aeroplanes, etc. The first directors are not named. Solicitors: John Bailey, Le Mesurier & Watts Jones, 35, Great St. Helens, London, E.C.3.

PLIANT WOODWORK CO., LTD.—Private company, registered December 14. Capital, £1,000 in 950 "A" shares of £1 and 1,000 "B" shares of 1s. Objects: to acquire patents relating to the softening, bending and hardening of wood and other materials; to carry on the business of joiners, woodworkers, manufacturers of aeroplane and motor-car parts, etc. The directors are: Fredk. W. Chambers (director of General Mining and Finance Corpn., Ltd., and others) and Edward Foote. Registered office: 66, York Road, Weybridge.

HARPER AVIATION PRODUCTS, LTD., was registered as a private company on December 1 with a nominal capital of £100 in 100 shares of £1 each. The objects are to carry on the business of manufacturers of automatic and capstan products, machined parts, pressings and assemblies for the aircraft and automobile industries, etc. The subscribers are: Leonard M. Haines, company director, and Leonard H. Beare, company secretary.

[The secretary of the parent company, the English Needle and Fishing Tackle Co., Ltd., writes to explain that the principal object of the above-mentioned new company is to provide protection for the trading name "Harper Aviation Products," which has been adopted by the engineering branch of the English Needle and Fishing Tackle Co., Ltd., for the development of its trade in components and sub-assemblies for the aircraft industry. The English Needle and Fishing Tackle Co., Ltd., is a £296,020 limited company incorporating the majority of the larger firms in the trades indicated by its name in the Redditch district, and has for many years carried on a business in fine engineering products of a light character.]

CHANGES OF NAME

NORMAN EDGAR (WESTERN AIRWAYS) LTD.—Aircraft dealers and air transport contractors, etc., 17, Manchester Square, London, W.1).—Name changed to Western Airways Ltd., on October 18, 1938.

WESTERN AIR TRANSPORT LTD. (17, Manchester Square, London, W.1).—Name changed to Straightaway Ltd., on October 18, 1938.

MILLAR AVIATION LTD. (aeroplane manufacturers, etc., 28, Bolton, Street, Piccadilly, W.1.).—Name changed to Aviation Equipment & Export Ltd., on October 18, 1938.

CROUCH-BOLAS, LTD. (Aircraft manufacturers, etc., Little Britain, E.C.1).—Name changed to Goodman Crouch, Ltd., on November 24, 1938.

INCREASES OF CAPITAL

BADDESLEY AIRCRAFT LTD. (St. Christopher Works, Thomas Road, North Baddesley, Southampton).—The nominal capital has been increased by the addition of £5,000 beyond the registered capital of £10,000. The additional capital is divided, into 200 ordinary shares of £25.

AIRCRAFT PRECISION LTD. (Engineers, etc., 284, Western Road, Merton, London, S.W.19).—The nominal capital has been increased by the addition of £3,800 in £1 ordinary shares, beyond the registered capital of £1,200.

S. E. OPPERMAN LTD. (Manufacturing, motor, aeroplane, electrical, mechanical and general engineers, etc., North Circular Road, Stonebridge Park, London, N.W.11).—The nominal capital has been increased by the addition of £40,000, beyond the registered capital of £60,000. The additional capital is divided into 400,000 ordinary shares of 2s.

BEDFORD SCHOOL OF FLYING LTD. (Barton Airport, Barton, Beds).—The nominal capital has been increased by the addition of £1,000 beyond the registered capital of £1,000. The additional capital is divided into 10,000 5 per cent. cumulative preference shares of 2s. each.

AIRCRAFT MATERIALS LTD., Midland Road, London, N.W.1.—The nominal capital has been increased by the addition of £12,000 in £1 ordinary shares, beyond the registered capital of £3,000.

MILLAR AVIATION LTD., 28, Bolton Street, Piccadilly, London, W.1.—The nominal capital has been increased by the addition of £9,750 beyond the registered capital of £1,000.

HIGH DUTY ALLOYS, LTD. (227,113). Constructional, general and mechanical engineers, etc., 89, Buckingham Avenue, Trading Estate, Slough.—The nominal capital has been increased by the addition of £100,000 in £1 ordinary shares, beyond the registered capital of £300,000.

PALESTINE AIR TRANSPORT, LTD. (295,240), 2, Grosvenor Gardens, S.W.1.—The nominal capital has been increased by the addition of £30,000, beyond the registered capital of £20,000. The additional capital is divided into 30,000 unclassified shares of £1.

LONDON AIR PARK FLYING CLUB, LTD. (295,948), 7, Park Lane, London, W.1.—The nominal capital has been increased by the addition of £15,000, beyond the registered capital of £5,000. The additional capital is divided into 15,000 shares of £1.

BRISTOL AEROPLANE COMPANY, LTD. (Filton, Bristol).—The nominal capital has been increased by the addition of £2,100,000 beyond the registered capital of £1,800,000.

EXETER AERO CLUB, LTD. (17, Manchester Square, London, W.1).—The nominal capital has been increased by the addition of £1,900 in £1 ordinary shares, beyond the registered capital of £100.

HARBOROUGH AIRCRAFT CONSTRUCTION COMPANY, LTD. (Aircraft Works, Logan Street, Market Harborough).—The nominal capital has been increased by the addition of £3,500 beyond the registered capital of £14,500.

PUBLICATIONS RECEIVED

Air Power in the Next War, by J. M. Spaight, C.B., C.B.E.; 5s., Geoffrey Bles, Ltd., 2, Manchester Square, London, W.1.

Ethylene Glycol—A Handbook on its Properties and Uses; Imperial Chemical Industries, Ltd., Millbank, London, S.W.1.

National Advisory Committee for Aeronautics: Report No. 624: Two-Dimensional Subsonic Compressible Flow Past Elliptic Cylinders by Carl Kaplan, 10 cents. No. 625: A Discussion of Certain Problems Connected with the Design of Hulls of Flying Boats and the Use of General Test Data, by W. S. Diehl, 10 cents. No. 626: The Transition Phase in the Take-off of an Airplane, by J. W. Wetmore, 10 cents. No. 629: On Some Reciprocal Relations in the Theory of Nonstationary Flows by I. E. Garrick, 10 cents. Superintendent of Documents, Washington, D.C., U.S.A.

Germany and a Lightning War: How Long Can Hitler Wage War? by Fritz Sternberg; 12s. 6d. Faber and Faber Ltd., 24, Russell Square, London, W.C.1.

Göring, the Iron Man of Germany, by H. W. Blood-Ryan; 15s., John Long Ltd., 34 Paternoster Row, London, E.C.4.

Getting a Job in Aviation, by Carl Norcross: 15s. McGraw-Hill Publishing Co. Ltd., Aldwych House, London, W.C.2.

Der Weltluftverkehr Elemente des Aufbaus, by Prof. Dr.-Ing. Carl Pirath, Von Julius Springer, Berlin, Germany.

Cardboard Crucifix, by Oloff de Wet; 8s. 6d. Wm. Blackwood and Sons, Ltd. 45, George Street, Edinburgh.

The Air Mariner, by a Flying-Boat Pilot; 6s. 6d. Sir Isaac Pitman and Sons Ltd., Parker Street, Kingsway, London, W.C.2.

Catalogue: *ESC and its Products*, English Steel Corporation, Ltd., Vickers Works, Sheffield.

Fifty Years of Bayer Remedies. Bayer Products Ltd., Africa House, Kingsway, London, W.C.2.

The Aircraft Calendar, by Eric Sargent; 7s. 6d. Sampson Low, Marston & Co., Ltd., 100, Southwark Street, London, S.E.1.

Air Defence of Britain by Air Comdre. L. E. O. Charlton, G. T. Garratt and Lt. Comdr. R. Fletcher; 6d. Penguin Books Ltd.

Winged Warfare, by W. A. Bishop; 6d. Penguin Books Ltd.

North to the Orient, by Anne Morrow Lindbergh: 6d. Penguin Books Ltd.

Flying Dutchman, by A. Fokker; 6d. Penguin Books Ltd., Harmondsworth, Middlesex.

An Air Fighter's Scrapbook, by Sqn. Ldr. Ira Jones; 10s. 6d. Ivor Nicholson and Watson Ltd., 7, Paternoster Row, London, E.C.4.

Annual Report of the Director of the Meteorological Office for the Year Ended March 31, 1938; 1s. H.M. Stationery Office, York House, Kingsway, London, W.C.2.

Joysticks and Fiddlesticks: The Unofficial History of a Flying Kangaroo, by F. S. Briggs and S. H. Harris: 8s. 6d. Hutchinson and Co. (Publishers) Ltd., 34, Paternoster Row, London, E.C.4.

The World's Airways, by Robert Finch; 5s. University of London Press, Ltd., 10 and 11, Warwick Lane, London, E.C.4.

Vingt Mille Lieues dans les Airs: Tour D'Europe. Tour D'Afrique dans un Petit Avion de Tourisme, by Baron de Foucaucourt. Payot, 106, Boulevard St. Germain, Paris.

Workshops, Calculations, Tables and Formulae, by F. J. Camm; 3s. 6d. George Newnes Ltd., Tower House, Southampton Street, London, W.C.2.

Practical Mechanics Handbook, by F. J. Camm; 6s. George Newnes Ltd.

Annual Report of the Board of Regents of The Smithsonian Institution, 1937, price $1.00. Superintendent of Documents, Washington, D.C., U.S.A.

How to Become an Air Pilot: Civil Air Guard edition, by Capt. R. L. Preston; 3s. 6d. Sampson Low, Martson & Co., Ltd., 100, Southwark Street, London, S.E.1.

The Book of the Sextant by A. J. Hughes; 5s. Brown, Son, and Ferguson, Ltd., 52-58, Darnley Street, Glasgow, S.1.

Aeronautical Research Committee Reports and Memoranda: Report No. 1816: Full Scale Tests of the Airspeed Envoy Type A.S.6 G., by J. E. Serby, R. H. Francis and P. Fortescue, 1s. 6d. No. 1825: Diffusion of Load in Certain Sheet-Stringer Combinations, by W. J. Duncan, and appendix by H. L. Cox, 2s. 6d. No. 1827: The Use of the Principle of Minimum Potential Energy in Problems of Static Equilibrium, by D. Williams, 2s. 6d. No. 1829: Measurements of Accelerations at Different Parts of a Boat Seaplane During Take-off and Landing, by G. C. Abel, 2s. 6d. No. 1830: Stressed-skin Structures. Compression Tests of Panels with Tubular Stiffeners, by I. J. Gerard and B. G. Dickens, 4s. All from H. M. Stationery Office, Adastral House, Kingsway, London W.C.2.

Air Piloting: A Manual of Flight Instruction, by Virgil Simmons; $3.00, Ronald Press Co., 15, East 26th Street, New York, N.Y., U.S.A.

Theoretical Hydrodynamics, by L. M. Milne-Thomson; 31s. 6d., Macmillan and Co., Ltd., St Martin's Street, London, W.C.2.

Icarus; An Anthology of the Poetry of Flight; 7s. 6d., compiled by R. de la Bère and three Flight Cadets of the R.A.F. College, Cranwell. Macmillan and Co., Ltd., St. Martin's Street, London, W.C.2.

A Simple Study of Flight (2nd edition), by J. D. Haddon; 4s. Sir Isaac Pitman and Sons Ltd., Parker Street, Kingsway, London, W.C.2.

Conquest of the Skies, by Peter Merin; 12s. 6d., John Lane, The Bodley Head Ltd., Bury Street, London, W.C.

Practical Aircraft Stress Analysis, by D. R. Adams; 2nd edition, 8s. 6d., Sir Isaac Pitman and Sons, Ltd., Parker Street, Kingsway, London, W.C.2.

Count Zeppelin: The Man and his Work, by Dr. Hugo Eckener; 8s. 6d., The Massie Publishing Co., Ltd., 50/60, Chancery Lane, London, W.C.2.

Jane's All the World's Aircraft; £2 2s., Sampson Low, Marston and Co., Ltd., 100, Southwark Street, London, S.E.1.

THE AIRCRAFT ENGINEER

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AN AIRCRAFT ENGINEER in PARIS

The 1938 Aero Show Reviewed

By H. J. POLLARD, Wh.Ex., F.R.Ae.Soc.

THE first impression of the major exhibits in the Grand Palais on the occasion of the Sixteenth *Salon de l'Aviation* was one of disappointment. The lack of what might be termed " new development " was the most striking feature of the Show, apart from such points as the various high-lift devices of certain machines on the Polish stand and the retractable tricycle undercarriage on the Fokker D 23. It became evident that the only way in which the visit could be made profitable would be by close scrutiny and considerable questioning on the stands.

On entering the show the first exhibit one noticed was the Morane-Saulnier 406 single-seater fighter. A brief description of this machine was published in the issue of *Flight* of December 1. A sample of spar construction on the stand attracted attention ; it does not appear to have been described previously. A view of the construction is shown in Fig. 1, the method of securing webs to flanges being illustrated in Fig. 2. While there is nothing unique in the spar itself, some of the details are unusual. The flange is of the well-known π section as incorporated in several of the Short designs. The most noticeable feature of the spar is the continuity of the root-end with the main length of the top and bottom flanges ; that is to say, each flange is machined from a single piece of steel.

It is, I think, the invariable custom of British designers to have a separate end-fitting for flange attachment, the obvious reason being that an enormous amount of machine work is thereby saved. To machine a flange continuously from end to end is not uncommon in British designs ; a considerable amount of scrap material is usually entailed, but to have sufficient sectional area available to allow of the end-fitting also being machined from the solid appears to be asking a little too much. If it is considered desirable to have the end lug integral with the main section, then it would appear reasonable to have the end " upset " or " jumped " to a larger section, through endwise pressure ; special forging equipment would, however, be required.

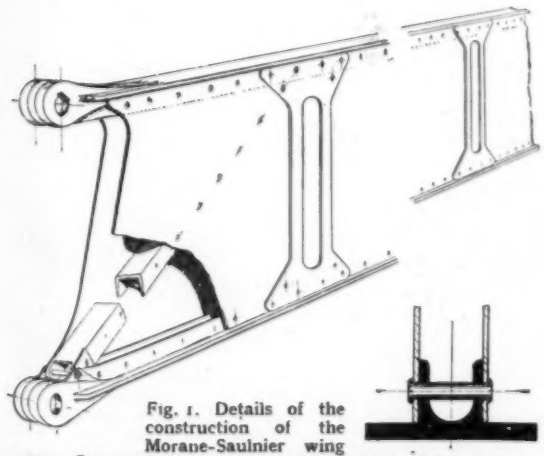

Fig. 1. Details of the construction of the Morane-Saulnier wing spar. The end fittings are integral with the steel flanges. In Fig. 2, on the right, is shown the method of attaching the webs to the flanges of the spar.

The easiest solution is to have a short end-fitting bolted to the spar flange, but the possible reduction in strength, due to the amount of material removed from the flange for the purpose of bolting, is sometimes a nasty problem for the structural designer. The localisation of stresses at the place in the wing where these things are least desired may be another troublesome aspect. These difficulties are usually made good through local reinforcements. It certainly seems desirable that, in the event of an end-fitting being damaged through bad drilling, over-reaming or the like, the fitting only should be scrapped and not the complete flange. There is, of course, a great deal to be said for the use of high-tensile steel for such parts as spar flanges, providing reasonable change of section can be achieved. Other features of the spar are shown in Fig. 1. The use of internal diagonal shear members seems scarcely necessary. Surely the two continuous plate webs, designed according to the tension diagonal theory, combined with vertical stiffeners as shown in the sketch, should be sufficient. Such a spar should be lighter and cheaper than one with diagonal shear members.

Slots and Flaps

Full of interest were the exhibits on the Polish stand. For example, all the monoplane wings were fitted with slots, automatic or manually operated, as on their Army co-operation machine, the " Mewa." This machine has the remarkable speed range of approximately 5 to 1. Such, in fact, is the landing angle of the aircraft at minimum speed, due to the blanking effect of the wing on the tail-plane, that the innermost length of the wing trailing edge has had to be specially up-tilted to render the tailplane operative. Even the ailerons were flapped, and it was amazing to hear that the lateral control was unaffected when the flaps were operated. On this, as on so many of the other exhibits, the twin-rudders were a distinctive feature. Apparently some store is set by the increased aerodynamic effectiveness of the tailplane through the elimination of the tip losses arising from the normal three-dimensional air flow. The gain through this arrangement is assessed at 12 per cent.

One eminent designer said that he preferred this layout because it was structurally more simple than the normal central placing of the fin ; the reason being that the fin

area can be distributed above and below the tailplane, thus reducing bending moments. Also, due to the size of the tailplane at the tip, less cumbersome fittings are required. As he put it: "there are already plenty of complications on the stern frame of an aircraft, and if the fin anchoranges can be put somewhere else the structural problem is much simplified." The reason for combining the dihedral tailplane with twin-rudders was obviously that the lower part of the fin would foul the ground if such dihedral were not introduced. Normally the tailplane is about the simplest component of all to build, and the difficulties attendant on the introduction of a central joint needs considerable compensating value in order that the added complication may be worth while.

Twin-Rudders

My reason for dealing with the subject of twin-rudders at some length is that a point which struck one on passing round the Exhibition was the large percentage of aircraft fitted with this type of rudder. This feature was also noticed on single-engined types, as for instance on the P.Z.L. "Sum" long-range reconnaissance and light bomber. The field of fire of the rear guns on military aircraft might possibly be reduced by this arrangement; a single, central, thin obstruction is better than two obstructions which, due to their oblique locations relative to the guns, must result in a larger blind area. If the manually operated guns are incapable of being yawed round at speed to an angle sufficient to bring the guns into line with the fins and rudders, then of course, it is

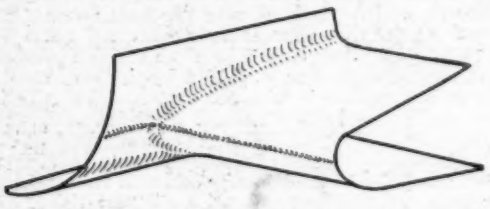

Fig. 3. Wing root covering and fuselage skin are welded together on the Potez 662.

good sense not to have a central fin, since by its elimination the maximum field of fire is achieved—taking into account the circumstances just given. Finally, on this point, the reason for the use of twin-rudder arrangements on twin-engined machines has always been regarded as due to the enhanced efficiency of the vertical tail surfaces through slipstream effect, but when they are used on single-engine machines, as in the case of the P.Z.L. "Sum," other reasons must be sought for.

A detailed study of one or two of the other exhibits proved instructive. The Fokker D.23 with its tricycle undercarriage was the aircraft that attracted as much attention as any on account of its very unusual form, but so much was written on this aircraft in various journals during the period of the Show that it is difficult to add anything new. One criticism of the machine, however, relates to the difficulty that the pilot might possibly have in getting clear of the aircraft with a parachute in the unfortunate event of such action being necessary.

Potez 662 Four-Engined Bomber

This machine, exhibited in flying trim, had a number of interesting features.

Twin-rudders mounted on tailplane having a dihedral, the rudders being below the tailplane to give full field of fire above.

Complete countersunk riveting on fuselage and wing.

Wing-root fillets riveted to fuselage and screwed to centre-section wings.

Joint between centre-section and wings is very neat, being made at a point between, and clear of, the inner and outer engine nacelle.

Engine cowling gills fitted only on the lower half of the nacelle. This is a particularly important matter.

Good accessibility for inspection between spars, obtained by having all panels removable on bottom surface—a first-class French practice.

Only two double formers in the whole of the fuselage construction, a notable aid towards easy production.

Folding doors for undercarriage stowage cover, using five 5in. hinges and not a continuous piano-type hinge.

Tail wheel cover particularly neat, but its function was not very clear.

The leading edge of the wing root is integral with the fuselage panel adjacent to it. This is made up of two pieces, and welded. (Fig. 3). A neat finish is thus obtained, although presenting difficulties in production and with interchangeability. Clean cowling has always been a distinctive feature of French aircraft, and it is to be hoped that this will be retained with quantity production.

Immediately behind this exhibit was placed a number of large illustrations of machines used for manufacturing structural parts of the Potez 662 and other French aircraft. Principal among these were plano-milling machines, and a particular point regarding workshop equipment for spar boom machining on the Potez is that a single-purpose type of plano-milling machine is used, in which the carriage carrying a self-contained motor, driving a mandrel through a variable-speed gear box, is mounted straddle-wise over a bed. The advantage is that the length of traverse required is only that of the member to be machined. These illustrations were of particular interest, having regard to the Morane-Saulnier 406 wing spar previously described.

Another feature was the fixture for fuselage assembly. Jigs are mounted on three wheels (not grouted in), thus enabling them to be passed along on the assembly line.

The Do. 17

The flush riveting is covered by paint of sufficient thickness to blend the heads into the surface. Although some doubt has been expressed as regards the real need for flush riveting, it is inconceivable that a firm which has developed the technique for a finish such as Dornier obtains will ever revert to any other finish.

The wing root fillets form part of the fuselage, thus providing extra available space in fuselage.

This machine demonstrates the application of "stretching press" forming of fillets and panels.

The undercarriage doors are split (as for the Potez) and the method of fitting rubbing strips is shown in Fig. 4.

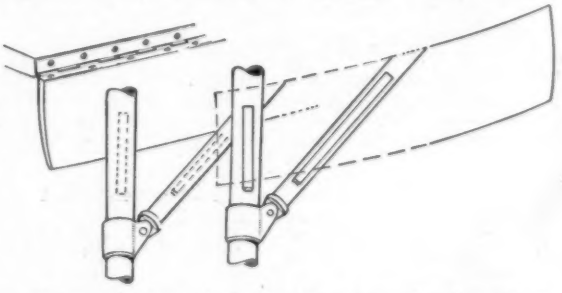

Fig. 4. Rubbing strips are fitted on legs and radius rods of the Do. 17 to prevent damage to edges of doors.

Absence of dihedral is noteworthy on this machine, as on the P.Z.L. exhibits. Great importance is attached to this feature on British aircraft, and considerable care is often taken to get it just correct; why then is it thought to be of no consequence in other countries? Possibly, in the case of the Do. 17, through the desire to build the wing all in one piece, but such cannot be argued for the P.Z.L. aircraft, and the Polish designers go to extreme lengths to get the most efficient aerodynamic devices on their wings; it would be interesting to know why a dihedral angle is considered of relative unimportance.

The application of magnesium is much in evidence on this machine. Examples of the use of magnesium castings are:—

The method used for making a stiff and light door is

to cast a frame of T-section members and rivet a cover sheet of light alloy on to the frame (Fig. 5).

Magnesium castings can be seen used for control column, rudder pedals, seat levers, etc., and in all cases it will be noted that the machining carried out on the casting is a minimum.

Castings are used for the main braced structure which forms the connection between the two oleo legs of an undercarriage unit.

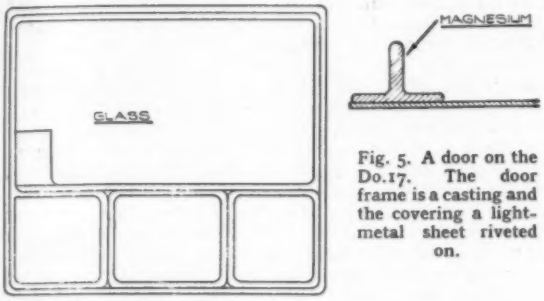

Fig. 5. A door on the Do.17. The door frame is a casting and the covering a light-metal sheet riveted on.

If we are to compete with these Continental manufacturers on a price basis we most definitely have to extend the use of magnesium castings and forgings. In this exhibit we saw magnesium castings used as main flying control levers, and if they are good enough for that purpose they are good enough for anything. One thing we can be certain about—Continental designers would not use this material in this particular form unless they were convinced it was safe; if it is safe for them it is safe for us. Users of practically unmachined magnesium castings have a tremendous advantage in the matter of production over aircraft manufacturers who have to use heavier materials for these parts, cast or forged, or who have to fabricate levers, etc., from a number of bits and pieces riveted together, which is necessary if the weight is to be kept down to that of a magnesium casting.

Apart from the Do. 17, there were many exhibits of interest on the German stand. It is difficult to say how many firms were actually represented thereon, but the examples of metallurgical products for aircraft construction were of extreme interest, particularly an enormous magnesium casting for use as the main member of a wing-building jig. Precision instruments were, of course, another feature. One is in some doubt as to the utility of numerous models in an exhibition of this description, but it can at any rate be said that the finish of these German models was superior to anything of the kind one has seen before.

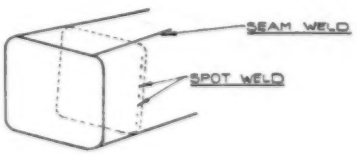

Fig. 6. Neat tank construction shown by A.Z. company.

A neat method of tank manufacture was shown on the stand of Etablissements A.Z., where both flame and electric spot welding methods were combined. The tank shell is externally seam welded, and the baffles are fixed to the shell by spot welding as shown in Fig. 6. It was evident that the matter of electric welding is, as was to be expected, coming more and more to the front. A number of machines were on view, and among these the Sciaky has reached a high stage of development. A large number of their machines are installed in this country, and in all probability the method will be used to an increasing degree.

The manufacturers of these machines are quite correct in not advising at this stage, the use of the method for fabricating primary structures. But in any aircraft there are many subsidiary parts which are not highly stressed and which are not subjected to fluctuating stresses severe enough to cause fatigue fractures. For that reason spot and seam welding will probably become commonplace in some parts of all aircraft at a very early date. Some very fine automatic riveting machines were on view. Among these was the Bourgain S.A. of Anciens Etablissements Bourgain. The machine exhibited was a cheap and robust type of foot-operated automatic feed riveter.

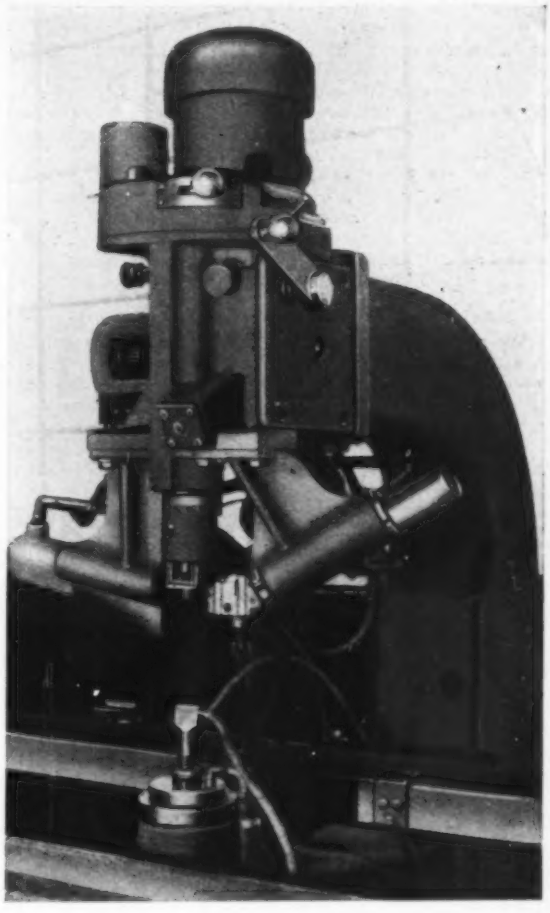

Fig. 7. The clever automatic riveting machine exhibited by the Frankfurter Maschinenbau. The machine drills, dimples and rivets at the rate of about 20 per minute.

But the *pièce de résistance* was the machine exhibited by F. M. A. Pokorny. This firm were demonstrating the automatic riveting machine recently described by Dr. Pleines at the R.Ae.S. lecture on riveting methods. The machine drills, dimples and makes rivets in three operations. It is claimed that rivets can be secured with this machine as quickly as a sequence of spots on a spot welder. Moreover, the plates in this case are dished one into the other. Thus an extremely strong joint is produced. The great feature of the riveted structure is that sheets or plates can easily be removed and replaced. Such is not the case with fused metal structures, and it is for this reason that one sees competition between the two methods, the outcome of which is not completely clear. In all probability both methods will be used side by side. The Pokorny machine (Fig. 7) appears to be the best of this type which has so far been developed. The characteristic features are as follows:—

It successively performs automatically all operations required to make a riveted joint, such as drilling (normal or special), countersinking, rivet feed and insertion from above, pulling tight, crushing and heading of the rivet (multi-blow principle), in one vertical axis, the work being

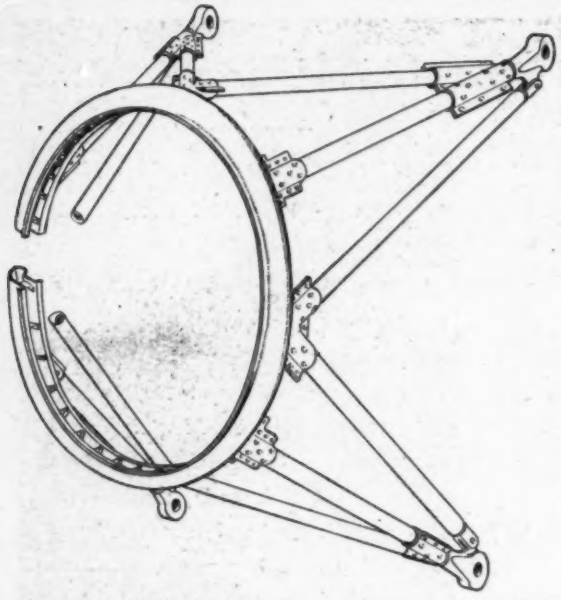

Fig. 8. In the Bronzavia engine mounting the ring is spot-welded but the tubes have bolted socket joints.

fixed during the riveting operation; it is also possible to rivet curved structural parts.

Drilling of the hole, pulling tight and driving of the rivet is performed under perfect sheet clamping.

By the provision of a supplementary working table with slide and an advancing arrangement, automatic fixing and advancing of the work, in accordance with the rivet spacings, are ensured.

All chips generated at drilling are blown away by compressed air; eventually, cooling may also be effected.

As to materials, there was the usual abundance of stampings and forgings in various light alloys, and the cost of these appears to have been reduced in recent years; even for comparatively small quantities off it is usually cheaper to obtain stampings than to machine from the solid or fabricate a fitting by riveting several small parts together. There were a number of aluminium alloy sheet materials having high strength and ductility characteristics that do not require heat treatment prior to forming, and it appears that French aluminium alloy manufacturers are going ahead of us on this score. There would appear to be in these days ever lessening need for the use of the salt bath. Materials only slightly inferior to Duralumin can now be obtained which can be used without such treatment, even though subjected to considerable deformation.

Bronzavia showed on their stand a typical form of engine mounting, built up from pressed sheet fittings and tube, the structure being spot-welded at all points. From the external appearance of the exhibit the structure weight should be low and production costs reasonable. This structure is clearly a cross between the completely-welded engine mounting, in which no sockets are employed, and the structure consisting of tubes and machined parts bolted together. The assembly (Fig. 8) shown on the Bronzavia stand is made up by methods lying mid-way between these two and is probably, on account of relatively low cost and the chance of easy replacement of parts, slightly the better structure.

One left the Salon feeling that there were far more subjects of real interest present in the Grand Palais than appeared possible after the first cursory viewing. It must be remembered that these exhibitions are held at the comparatively brief interval of two years only, and that it is altogether unreasonable to expect aircraft or any other engineers in that period to experiment with and try out fully completely new ideas, particularly on matters involving major change. Bearing that in mind, we should be well satisfied with the Paris Show of 1938.

Production Tools

TWO catalogues recently issued by the Hey Engineering Co., Ltd., of Lythall's Lane, Coventry, illustrate and describe in detail production tools, such as chamfering machines, tapping machines, multiple-spindle vertical and horizontal drills, stelliting machines, profiling machines, valve-seat grinders, and milling machines.

In Slow Motion

PARTICULARLY in aero-engine testing work, stroboscopic instruments can provide a great deal of useful information. A device of this kind is the new light-type electric Ashdown Rotoscope, made by A. J. Ashdown, Ltd., 25, Victoria Street, London, S.W.1.

One of the principal claims made for this instrument is that it is self contained and that no actual contact with the machinery under observation is necessary. The new light type covers speed ranges of from 150 to 4,800 movements per minute (Type L.E.), or 1,500 to 12,000 movements per minute (Type L.E./T). A descriptive booklet is obtainable from the makers.

Riveting and Piercing Machines

FOREIGN methods of riveting have recently received publicity and many claims have been advanced. With true British reticence little has been said of methods and tools developed in this country. Aircraft Materials, Ltd., of 104, Midland Road, London, N.W.1, with their experience dating back to the metal Siskin, have developed the closing of solid, cup and hollow rivets to a high pitch of production efficiency. The range of riveting equipment is from automatically fed hand tools to pneumatically operated machines, and from eyelet-spinning-over machines to piercers which punch a number of holes at a given pitch.

Some interesting rivets of the hollow buried mandrel-head type are available. Essentially similar to the familiar "pop" type, the mandrel head, instead of being left loose inside the job, is left with a portion of stem buried inside the rivet, so forming a seal. To resist corrosion the mandrel head and stem are plated. Pop-type tools are employed for manipulating these rivets.

To hold the sheets together for riveting, Aircraft Materials, Ltd., have patented an extremely cheap, simple but effective spring steel clamp.

For Production Purposes

SOME impressive photographs of the interior of the company's works appear in a booklet recently issued by the Birmingham Tool and Gauge Co., Ltd., of Handsworth, Birmingham, 19, who specialise in milling cutters, gauges, and small precision and single-purpose machines, as well as in actual aircraft components. The firm states that it has made a special study of the production requirements of the aircraft industry.

Tools on Tour

A MACHINE tool demonstration van, showing under working conditions the products handled by Burton, Griffiths and Co., Ltd., is at present touring industrial areas. The exhibits include a B.S.A. three-quarter-inch single-spindle automatic screw machine, Ex-Cello fine boring machine, Ex-Cello hydraulic power unit, and a wide selection of small tools and gauges.

Particulars of the itinerary of the van are obtainable from Burton, Griffiths and Co., Ltd., Montgomery Street, Sparkbrook, Birmingham 11.

Self-lubricating Bearings

SOME of the applications of "Oilite" self-lubricating bronze bearings in aircraft are illustrated in an attractive booklet issued by the makers, the Manganese Bronze and Brass Co., Ltd., Handford Works, Ipswich, Suffolk.

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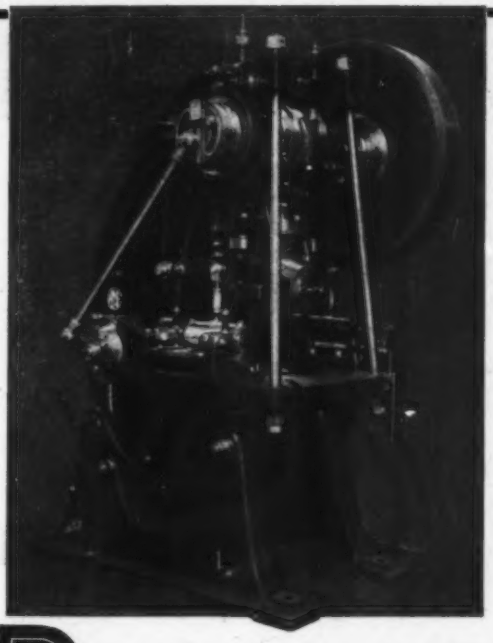

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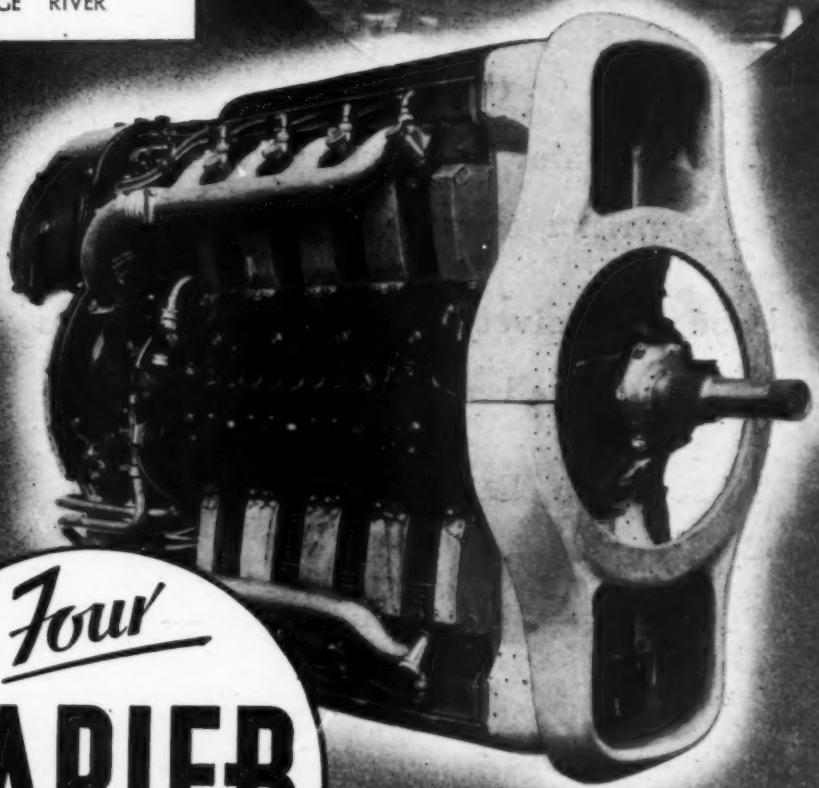

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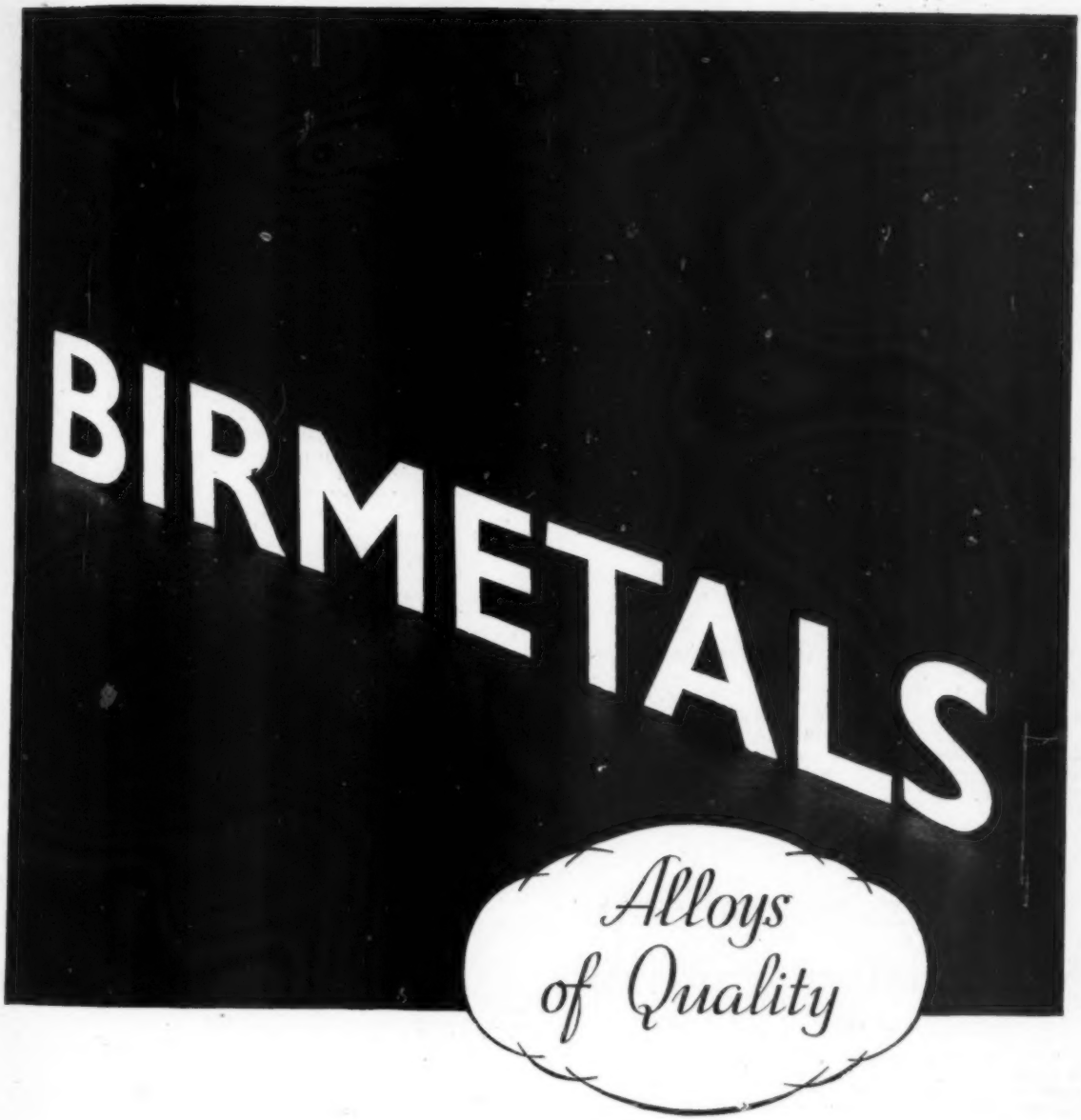

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